The Builder.

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Rivers: their Functions and their Treatment.

PURSUING our observations on this subject,* we would notice that the most successful results in the improvement of tidal rivers have been attained in many cases by simultaneously regulating the width of the channel and deepening the bed of the stream. The latter process may be effected in soft soils, such as the alluvial plains of India, by means of the river current itself, which when properly regulated, will scour its own channel to the required extent. But it frequently happens that river shoals acquire, in the course of time, such hardness and consistency that no improvement of the channel will suffice for their removal. In such a case, the principle usually adopted by engineers is to remove the cause of the formation of shoals by measures tending to increase the velocity of the current, and then to remove the shoals themselves by dredging. The latter process has the further advantage of increasing the capacity of the tidal channel, and of allowing the tide to flow freely in both directions, which has the effect of increasing both its height and depth. Dredging has accordingly been very extensively practised in navigable streams; and in the Thames alone it is stated that about ten millions of cubic yards have been thus removed from the bed of the river.

The usual means of regulating the width of rivers is by the construction of longitudinal or training walls on either bank. They are built, according to circumstances, of masonry, concrete, or timber piling, or formed by earth embankments pitched with stone where exposed to the running water. Such embankments are also frequently formed of alternate layers of earth and fascines, or bundles of faggots, which makes a cheap and good construction for rivers of moderate velocity. Where the space or foreshore to be reclaimed is very large, and the filling at the back of the training walls would consequently be expensive, it is usual in the first instance to run out timber groynes from the bank at intervals, about half-tide high, across the space which it is proposed to reclaim. These constructions intercept and gradually collect between them a considerable portion of deposit from the river; and when this is done, the training walls are built. The most successful instance of a river improved in this manner is, perhaps, the Clyde at Glasgow, where the depth available for navigation at low water is stated to have been increased by the measures above described judiciously applied, and by dredging, to no less an extent than from 2 ft. to 20 ft. These works, and the importance of the port resulting from them, are, perhaps, the greatest triumph on record in this branch of engineering.

* See p. 37, *ante*.

In some cases, as in the Dee at Chester, groynes, as above described, have been applied without further constructions. But this treatment has been found to produce irregularities in the course of the stream, and, in fact, to be prejudicial to the improvement of navigable rivers rather than the contrary.

The above are the principal natural phenomena at and near the mouths of navigable rivers with which engineering skill and science have been required to deal. It is now proposed to proceed upwards, and review the causes of impediment to navigation and drainage which usually occur in the higher portions of streams.

It has been already stated that the lower reaches of rivers generally flow through a flat country, and consequently with a comparatively sluggish current; and this applies to the portion both within and immediately above the tidal influence. It is a curious natural fact that the tendency of a river under these circumstances is not to preserve a straight course, but to form for itself a winding or circuitous channel. The current, in the first instance, is probably deflected by some artificial obstruction, such as a partial hardness of the soil, from its straight and proper course, and cuts its channel in the direction of least resistance. The weight and force of the stream, instead of moving along the middle of the river, as they would do in a straight channel, are by this means directed sideways, so as to impinge on one or other of the banks, whence the stream is again deflected (like a billiard-ball striking obliquely upon its cushion), in an angle corresponding to the angle of incidence. This takes place in nature upon the largest scale; and the effect of these irregularities is, in many cases, surprisingly regular, forming a continuation of alternate or S bends, of equal curvature. Of this the Thames presents many notable examples, and the great rivers through the alluvial plains of India are often wonderfully regular in the form and extent of their sinuosities.

Where the river is of this nature, the outer or convex side of the curves or bends is naturally the deepest; and the inner side is liable to shoal. Between the bends the line of main current and of deepest water naturally sets across the river, from the outer curve on one side or bank, to the succeeding outer curve on the other.

It is evident from the above description, that the current will tend continually to abrade or bite upon the outer curve or bank at these bends, and to deposit and shoal the course of the water at the inner curve. The continued abrasion in the former case also tends to widen the bed of the river, to diffuse the stream over a larger space, and to weaken its force in proportion.

The effect of such sinuosities is also to increase the length of the channel to a large extent, and to diminish its rate of fall in proportion, thus aggravating the evil of insufficient velocity to which rivers in flat countries are liable. These remarks are even more applicable to the reaches above the tidal influence than to those below it, as the volume of the river water, and its consequent capacity for maintaining a clear channel, are usually very much smaller than that of the tidal stream.

The straightening of bends, so as to form a direct and uniform channel, is of course the most obvious remedy for this evil; and it occasionally happens, when a bend is very circuitous, that a very short artificial channel will save a comparatively great distance in length of river. These operations, however, involve the necessity of many precautions to insure their efficiency. The inclination of the channel in the new work of course becomes greater as its length is diminished, and the velocity of the stream is proportionately increased, involving the probability that the bed of the new channel may be scoured to a much greater extent than that of the old, and that the material so removed may be deposited in the lower portion of the stream, where the current resumes its original rate of flow. Moreover, at the lower junction of the new and steeper with the old flat channel, the increased velocity of the stream receives a sudden check; and the current will expend its force, unless efficient measures be taken to prevent it, in ploughing or tearing up the bottom at the point where its velocity is so checked, and in throwing up the excavated material beyond in a bank or bar across the river.

The scouring power exercised by a river on various soils is, of course, measured by the velocity of the water at the bottom, which, owing to friction, is much less than the surface velocity.

It may therefore be interesting to state the comparative surface and bottom velocities of rivers, and the effect of those velocities in scouring various soils.

Surface and Bottom Velocities in Feet per Minute.

Surface.	Bottom.	Surface.	Bottom.
20	5	260	192
40	16½	280	210
60	30	300	228
80	45	320	245
100	60	340	263
120	75	360	280
140	92	380	300
160	108	400	315
180	125	420	333
200	142	440	351
220	158	460	368
240	176	500	405

Effect of different Velocities of Water in Scouring various Soils.

15 ft.	per minute will	scour	fine clay.
30 ft.	do.	do.	fine sand.
45 ft.	do.	do.	coarse sand.
60 ft.	do.	do.	fine gravel.
120 ft.	do.	do.	round shingle, 1 in. diameter.
180 ft.	do.	do.	angular stones as large as an egg.
300 ft.	do.	do.	conglomerate.

One of the most important points in the treatment of rivers is to ascertain their liability to be affected by, and to provide measures against, the destructive results of heavy floods.

The effect of floods is very variable in different rivers, according to local circumstances. It is more destructive when, owing to a retentive soil, to steep slopes on the sides of the valley, or to both in combination, the waters of heavy rains are collected rapidly in the river, so as to swell its volume beyond the capacity of its channel. These effects are modified, on the other hand, by an absorbent soil, or by a flat and extended valley, which retains the water, and obliges it to pass slowly to its natural outfall, thus enabling the discharge to be gradually effected. In this way the flooding of rivers has been aptly described as a race against time; though in the case of long-continued and heavy rains, when the surface and soil become fully saturated, the rainfall begins to flow into the river with almost equal rapidity in the latter as in the former case. But the most rapid and destructive inundations are caused by the melting of snow, and almost all the great rivers of Europe owe their highest floods to this cause.

The absorbent strata in this country are chiefly sand and gravel, chalk, limestone, and sandstone. The extent to which floods, as well as other conditions of a river are modified by the prevalence of porous strata in its watershed, is well illustrated in the case of the Thames itself. The upper portion of this watershed consists, as is well known, of the chalk formation, which absorbs and stores the rainfall to a large extent, returning it to the river in dry weather by means of perennial springs. In consequence, the stream, excepting in long-continued rains, is uniform to a remarkable degree in the quantity of water it discharges; and its liability to flooding is caused much more by the artificial obstruction of weirs and mill-dams than by any natural condition attaching to the river.

As a rule, a flood commences when the strata, whatever they may be, are saturated with water so that their absorbent qualities are exhausted

and this is frequently exemplified by the circumstance, that a given amount of rain in summer is found to be disposed of by absorption and evaporation, and never reaches the river at all: while the same amount in winter, with a saturated atmosphere and soil, will pass into the river without diminution, and sometimes cause a flood.

The absorbent strata tend to moderate floods, not only in proportion to their porosity or capacity for containing water, but (especially in the case of limestones and sandstones) by the dip of their beds, which, particularly when of steep inclination, facilitate the subterranean escape of the rainfall.

Again, the effects of a flood are moderated on a large scale in nature by the existence of lakes, which afford an extensive area for the storing or retention of flood-waters, and enable their contents to be discharged gradually and quietly by the outlet rivers at their lower extremities. Many instances of this kind may be referred to. The two great lakes which supply the source of the Nile are said to furnish to the upper portion of that river a remarkably uniform amount of water; and although the river receives directly the flood waters of the districts below, which convey the well-known mud deposits of Egypt, yet the lakes referred to have the effect, on the whole, of moderating the flooding of the country to a material extent. On the continent of Europe also, the great lakes at the foot of the Alpine ranges, which receive the waters of the melting snows, serve the purpose of moderating the inundations, which, though still often destructive, would render the valleys below those lakes totally uninhabitable if their impetuous discharges were uncontrolled by this provision of nature.

The modification of floods by means of engineering works, is a matter of considerable difficulty. In some cases, as in the Po, dykes or artificial banks have been constructed for this purpose; but the tendency of the river to raise its bed by the deposit of the material carried down by the floods, has involved the necessity of constantly adding to the height of the dykes, until the river is raised above the level of the surrounding country, rendering any future escape of its torrent liable to be doubly destructive.

The French engineers have proposed, for moderating the floods of their great rivers, to form a system of artificial lakes at the mouths of the tributary streams, so that the main stream should not be suddenly surcharged. But the usual and perhaps the most feasible course is to regulate, deepen, and improve the bed of the river itself, and to remove artificial or natural impediments from it, to the utmost practicable extent.

In very many rivers, of which the Thames and Shannon are notable examples, a constant antagonism exists between the interests connected with the navigation and those connected with the drainage of the adjoining country. The former can only be maintained by the construction of weirs or dams, which keep up the water to an artificial height so as to give it depth for navigation, at the same time affording water-power at the overfalls for mills. With the drainage, however, the matter is reversed, as the impediments thus created to the flow of the stream render it impossible to carry off the flood waters with sufficient rapidity from the low-lying lands adjacent to it. It becomes a question, therefore, of the comparative value of the drainage, or of the navigation, to the district. Until the present generation the interests of the navigation have been generally preferred, but the great extension of railways throughout Great Britain has much deteriorated the value, both in a commercial and national sense, of river navigation; and the modern tendency of public policy is to remove all obstructions to the discharge of rivers, as far as it can be reasonably effected with regard to the important private interests which the former policy has created.

It appears, in short, that in the early history of a country rivers play a most important part in providing the means of internal communication; and the Mississippi and other great streams of the American continent readily occur in illustration. As civilisation and wealth increase, however, the necessity for drainage is more felt, while superior and more rapid means of communication by railways become universal. The tendency in this case, therefore, is to confine the navigation to the lower portions, where seagoing vessels may be accommodated, and to devote the upper portions to their original purpose of the drainage of the country.

The line of longitudinal section of a river generally forms a concave curve, which, of course, is flat at the lower end and steep in inclination at the source. In the upper portion the water supply is generally limited, owing to the contracted water-shed and steep inclination of the bed; but the storm-water for the same reason is delivered into the stream with great rapidity where the strata are composed of retentive soils. Such positions are especially favourable for the working of mills, and are generally so occupied to the utmost possible extent in this country.

It is pleasing to reflect that at no previous time in our history have the advantages afforded by our British rivers, whether in a commercial, agricultural, or sanitary point of view, been so highly appreciated as at present. The maintenance of their volume is jealously guarded; and the preservation of their purity from all pollution is being made the subject of the most minute scientific investigation and the most careful legislation. In these facts the lovers of nature and of progress may alike rejoice; for in no other natural objects than our flowing streams are the useful and beautiful more fully united.

THE WINCHESTER GUILDHALL COMPETITION.

OUT of the forty-six sets of drawings which, as we have already mentioned, have been sent in competition for the proposed new Guildhall and Public Offices at Winchester, the town-council have selected six which they recommend for special consideration; the others being, as we gather, already looked upon as "out of the running." We will say a word of these favourites first, bearing in mind that the cost of the building, including all fittings of a permanent kind, such as chimney-pieces, &c., was limited by the terms of the competition to 11,000*l*. The set with the motto "*Tria juncta in uno*" (numbered 1 in the order of hanging) is what we should call a rather fidgety design, proposed to be erected mainly in Beaulieu brick, with bands and alternating voussoirs in Fareham red brick, and Bath stone dressings, with a good deal of notching and cutting of round dots by way of decoration; in short, an average specimen of a style of modern Gothic design rather too familiar to every one, and calling for no further remark. The plan (to which this set of drawings probably owes its position) is simply and conveniently arranged, especially with regard to the working of the business department, the surveyor's and town-clerk's offices and committee-room, easy communication between which was, of course, one demand in the conditions. Egress from the assembly-room, however, is far too scantily provided for, and concentrated too at a point close to the platform, just where early departures among the audience would most disturb whatever was going on. "Caer Gwent" (8) is a much better design architecturally. The assembly-room is here brought to the front, and its position and character marked by large windows, with geometrical tracery of a simple design, with gabled heads and finials carried up through the cornice and parapet; the general style being Early Geometric Gothic. An angle tower, flush with the face of the building, forms the main feature; and a bay-window not unappropriately marks the position of the library and reading-room. The plan, while presenting no feature for special comment, appears satisfactory in the main. This design is also proposed to be built in brick and Bath stone, and would look less satisfactory when carried out in these varied materials than it does in the ink perspective drawing, which, of course, does not indicate the colour effect. The architect's estimate is 10,300*l*., which is probably under the mark; but the design comes nearer to being within the proposed cost than most of the others. In "Utile dulci" (25) the library and museum occupy the front of the principal floor, and the assembly-room is at the back; an arrangement adopted by most of the competitors, and which gets over a good deal of difficulty in planning, at the cost of some degree either of truthfulness or effect in architectural design. This is a modern Geometric Gothic design, in very bad taste. The centre tower, with its preposterously high gable-roof, and masses of roof clinging against the side walls, is a most inartistic feature; and there is nothing elsewhere to atone for this. The assembly-room, with low walls and a high wooden painted ceiling in several cants, is shown in a large rough pen-and-ink drawing, with a good deal of faulty perspective: the whole of the drawings are just of the kind to captivate a "committee;" but the cost would far outrun the estimate, and there is not much chance of its being executed. The next design to this, "Manners makyth Man" (26), is a great contrast; both drawing and design are evidently the work of a practised and artistic hand, and, considered purely as a piece of architectural composition, this is one of the best designs in the room. The architect has adopted the view that, as the proposed building will stand low and be opposed by several lofty structures, height is a *sine quâ non*. The result is a building considerably cramped on plan and carried up higher in proportion than most of the others; the style is a modification of Early Gothic (a description applicable to a majority of the designs exhibited), plain even to severity, very solid-looking, the effect being principally obtained by opposition of line and surface rather than ornament; the windows admirably treated artistically, but far too small practically in many cases. The assembly-room is at the back, reached from a front entrance through a centre hall, which is carried up two stories, with a gallery round on the upper story, and marked in the external design by a tower finished with a simple but very picturesque wooden roof and lantern. The author draws attention to his planning of retiring-rooms, in connexion with the assembly-room; the ladies' cloak-room opening to the left out of a corner of the central hall, the gentlemen's room being on the other side, but on a higher level, and only reached by a special staircase not leading to any other department; an arrangement which his experience in planning public rooms has led him to think necessary. The objections to this design are, practically, that the business portions are too much separated, the committee-room apparently being only accessible from the town clerk's offices by going up a circular stair-turret (carried through all the stories, and forming a feature in the design), and then traversing the whole width of the building; and the rooms all appear small. Artistically, there is in the composition, with all its picturesque qualities, too much Mediæval sternness of expression; the architect's mind has been running too much on the *past* of Winchester, too little on the present and future. The material is to be of brick, with ashlar facing; and with all its plainness, such a design would necessitate such very good and solid execution to do it justice, that it would perhaps run away with more money than some more showy buildings. The windows are proposed to be of plate glass below the transoms, and light stained glass in the heads. Were this design selected the Winchester people would have a Guildhall which would possibly be admired by every one except those who had to live and work in it. "Concentration" (27) is a very ably and cleverly arranged plan, every bit of space being utilised. Perhaps the lines of communication are scarcely wide enough, nor the different departments sufficiently separated: the access to the museum and sessions-house, for instance, from the same corridor, and with the doors closely contiguous, might be found practically inconvenient. The library and museum occupy the front, and consequently have windows larger than necessary, to give dignity to the principal elevation;—an instance of falsity of architectural treatment which this arrangement may give rise to; for a library, so far as it is a storehouse for books, is a place where wall space is of more importance than large windows, and which, indeed, is best lighted from above. The general design is not unlike in character to that of No. 25, but better, especially as to the central tower. No. 38, marked by a star, is one of the few Classic designs in the room, and is not calculated to assert the superiority of Classic over Gothic, being, in truth, a sadly commonplace affair, with a row of engaged columns in front, with cornice breaking round them and a statue over each. There is a little more originality of treatment in the upper part of the central tower; but it is flat and weak in manner, and the iron dome-shaped finial is not a happy feature. The assembly-room is on the ground-floor at the back, with a great array of retiring-rooms all round it, and very meagre kitchen accommodation, for a place where large dinners may occasionally be given. The front is all to be of a light-coloured freestone, with panels, &c., of red Mansfield stone; and the author states that the quantities have been approximately taken out, and that he "thinks it would obtain a tender" (for the sum limited) "from any respectable builder." We differ from him.

Among designs not honoured by special selection we must notice "Rufus" (16), which ought to have taken place before some of the selected ones. This is a very quiet but truly architectural design, shown in some very pleasing elevations etched in ink in slight but artistic style; there is no perspective view so far as we could discover. The author describes his style as "a modification of Late Middle Pointed, with some introduction of the spirit of later domestic detail:" the front shows an elevation with two rows of mullioned and foil-headed windows, under square labels, and a tower, very simple, but with a good deal of character about it, rising flush with the wall over what is called the "magistrates' entrance." The main entrance is under a picturesque carriage porch, projecting from the centre of the front; between the windows are chamfered buttresses terminating in a finial carrying a statue, half recessed into the wall between the upper row of windows; the statues not being included in the estimate. The assembly-room occupies the flank of the building, a lofty apartment with timber roof and external buttresses, shown only in section. These two fronts are to be of Ancaster or Doulting stone, the rest of the building of Fareham white bricks; the principal staircase to be of oak, other woodwork of pitch pine, varnished. The plan is a little scattered, and there is rather a deficiency of staircase accommodation, but on the whole this is one of the best designs in the room for the purpose; indeed, it seems to us the only *good* design which looks as if it would really come within the sum stipulated. The author will, however, we suppose, have to content himself with the satisfaction of having competed honestly; but that this design should have been thrown out for such productions as No. 1, 25, or 38, is one more instance of the necessity of committees having some adequate professional guidance in making their selections in such cases. "Nisi Dominus frustra" (30) is another clever though peculiar design, totally different from the last-named, and probably an expensive one, but showing much boldness and originality of treatment in bold geometric Gothic, the centre feature (we can scarcely call it a tower) consisting of a square mass rising out of the front, and broken above into what may be described as a Greek cross on plan, with smaller diagonal arms in the angles; on each wing of the front a bay window, boldly corbelled out from a short wall shaft, forms a picturesque feature; the whole design, shown in a fine ink perspective drawing, is, though rather *outré*, very clever and suggestive. Of the two designs signed "Manus" (17 and 18), the first is so unhappy that it is difficult to believe they are by the same hand; 18 shows considerable merit and originality in the treatment of flowing tracery under circular-headed windows, and has a definite expression of its own, but there is too much roof, and it appears altogether an unpractical design. "Civis" has proposed to build a cathedral for his townsfolk, as "cives" in these kind of competitions generally do. His perspective drawing is a fine one, but the whole thing is totally impracticable. No. 3, signed with a white circle, is a most elaborate set of drawings, showing in two large perspectives alternative designs, in Gothic and a kind of Classic, the latter somewhat original in parts, but very heavy and uninviting. "Sans Dieu Rien" (6) is a very quiet little design, somewhat too domestic in expression, but, though rather weak, not without a certain picturesque originality in a kind of modification of Elizabethan Gothic. "Non modo sed quo modo" (41: we presume the author meant to say "Non *quo* sed quo modo") is a rather striking Gothic design, showing considerable breadth of treatment, with a massive square angle tower rising from the wall plane, and containing the main staircase. Judging from the plan, this must be the work of a young hand. The retiring-rooms are at the wrong end of the assembly-room, and only to be reached through the latter, so far as appears from the plan: and the circular turrets at each side of the centre gable have no meaning on the plan, and, indeed, spoil one of the ground-floor offices. "Well Considered" (36) is another Gothic design of somewhat similar character to the last-named, but with a central tower; the author has made a sad mistake in placing a projecting baloony on the face of the tower (which is flush with the main wall), just on a level with the cornice of the main building, so as to carry on the horizontal line, and break the vertical composition just where it should be emphasised. The roof of the tower, a square on plan set diagonally, would not have a happy effect. "Fortuna sequatur" (33), one of the few Classic designs in the room, may be mentioned as showing a front elevation quiet and in good taste; the plan is a mere division of an area into squares, and is probably also the work of a young hand. There are no other designs which appear to us to call for any special commendation; we might specially abuse, "in good set terms," several of them, were we so minded: suffice it to say that this collection of drawings, while containing some very able designs, and showing an aggregate of much labour, appears to us to exhibit also rather more than the usual proportion of that peculiar kind of violent and sensational drawing and designing which competitions, more than anything else, afford opportunity and temptation for.

The council engage to employ the architect who may gain the first premium to carry out the work at the usual professional remuneration; but their dealing with the second premium is highly unfair: the fortunate gainer of this is to have the option of receiving his drawings back again without any premium, or receiving a 50*l.* premium and leaving his drawings in their hands. This is "premiating" with a vengeance: 50*l.* and the return of the drawings would probably not pay the architect for the mere time bestowed on them. We hope the council will reconsider this, and not act shabbily. They are to meet on the 2nd of February.

AN ACCOUNT OF ST. THOMAS'S HOSPITAL.*

IN compliance with a request, I have much pleasure in laying before you a brief account of the new St. Thomas's Hospital, now approaching completion on the Albert Embankment, at Lambeth. The hospital at Southwark, which had existed in some shape since the year 1207, was incorporated and received its Charter from King Edward VI. in the year 1551, and a few preliminary remarks on the cause of its migration from that ancient site may not be uninteresting, particularly as such removal involved many important questions, not perhaps purely architectural, but such as are continually arising in our professional practice.

In 1859 a certain adventurous railway company, called the Charing Cross Railway, conceived the idea of taking a line from London Bridge to Charing Cross, and their great difficulty appeared to be to pass the Borough without intrenching either upon St. Saviour's Church or St. Thomas's Hospital. They, however, respected the Church, not, perhaps, from any religious sentiment, and determined, as being most likely to succeed in their application to Parliament, on taking a small corner of the grounds of St. Thomas's Hospital, and they accordingly served a notice of such intention on the authorities. The Governors, feeling that a railway perched upon an iron viaduct within 10 ft. or 12 ft. of a most important portion of their hospital, irrespective of the damaging effect it would have on the whole institution, would be destructive of its usefulness, were reluctantly compelled to oppose the Bill in Parliament. After a long and arduous struggle, the Committee of both Houses came to the conclusion that there was a great public necessity for such a communication, and that the hospital must yield, and the Lords' Committee, after expressing a strong feeling on the injury which would accrue to the hospital, passed the preamble. Certain negotiations followed, but came to no result. In December, 1860, the railway company served a notice on the hospital to take the part they required. The Governors felt that a railway and a hospital could not co-exist in such close proximity; and, after full consideration, gave the company notice to take the whole under the 92nd clause of the Lands Clauses Consolidation Act. The company resisted such request; but on the matter being argued before the then Vice-Chancellor Wood, he, without hesitation, determined that the hospital view was the correct one, and that the company could not escape from the obligation of purchasing the whole hospital. Such being the result, one cannot but regret that the line was not taken directly across the hospital, passing through the centre of the London Bridge station, thus accommodating both the Brighton and the South Eastern lines, and crossing the High-street at a right angle, instead of the tortuous and inconvenient plan which has been carried into execution at an enormous cost. Next came the question of how the compensation was to be assessed, whether by jury or by arbitration; and looking to the uncertainty which then attended the verdict of juries, it was determined to refer the matter to arbitration; and after considerable difficulty in finding a suitable umpire acceptable to both parties, Mr. John Stewart, of Liverpool, a gentleman of great eminence in such matters, was ultimately appointed in September, 1861. The reference commenced and lasted for seven days. There was necessarily a considerable discrepancy in the valuations made on behalf of the hospital and of the railway company, the highest, on behalf of the hospital, being 478,000*l.*, and the lowest, on behalf of the company, 145,000*l.* Mr. Steward's award amounted to 296,000*l.*

In 1862 the company took possession of the hospital premises, arrangements having been made by the governors for the use of the Surrey Gardens as a temporary hospital. A fire had recently occurred, burning out the whole of the interior of the music-hall, and by the introduction of new floors and roof, and sundry alterations to outbuildings, a temporary hospital was provided for about 200 beds in a very short time, and has, I think, fairly answered its purpose during the interregnum. Next came the difficult question of the selection of a site for the new hospital. The governors had no compulsory powers of purchase, and to acquire eight or ten acres within reach of the population was a matter not easy of solution, and the question was further involved by the views expressed by certain persons as to the desirability of making it a suburban hospital. Several sites were suggested and valuations made, one being the removal of Bethlehem to the country and the occupation of that site for the purpose of St. Thomas's Hospital, and I prepared a design and estimate for a new Bethlehem Hospital to be erected at the cost of St. Thomas's. All this, however, dropped through, and ultimately the surplus land created by the Albert Embankment was fixed upon, and a contract made with the Metropolitan Board of Works for about eight acres and a half when embanked, at the sum of 90,000*l.*, half of the eight acres and a half being land reclaimed from the river. Great objections were raised by some parties to the site: it has been called a mud-bank, and all sorts of uncomplimentary names, but it appears to me that a better site for a metropolitan hospital could not have been selected (always, of course, presuming the river to be cleared of the sewage). The great tidal flow of the river forms a powerful natural ventilator, changing the volume of air continually, and the quiet soothing influence of water, and absence from noise and dust, render it, in my opinion, a most desirable locality for the purpose of a metropolitan hospital. I do not mean to imply that some breezy down in the country would not be more conducive to health, but to place a metropolitan hospital in any such distant locality would render it practically useless.

Having sold the old site, and done the best we could for the patients by the conversion of the Hall at the Surrey Gardens, which has seen the strange vicissitudes of an abode for music, a tabernacle for Mr. Spurgeon, and a refuge for a hospital, and the question of a new site being settled, I was instructed to prepare the necessary design; and as the subject of competition is one of some interest, I may mention that on my appointment as architect and surveyor to the hospital, now some twenty-five years ago, the Governors reserved to themselves the right of submitting any great work which might arise to competition. They did not, however, avail themselves of this right; and although it is not for me to say anything as to the result of the course they took, yet I venture to think that they were relieved from some trouble, anxiety, and expense, and I take this opportunity of thanking them for the confidence they reposed in me. A Committee of Governors, accompanied by myself, visited several of the Continental hospitals, and the Committee of the Medical Staff assisted in maturing the several matters of detail. The design is arranged on the pavilion system, now generally admitted to be the best for hospital purposes, and specially suitable for the land on which the hospital was to be erected. The nature of the site did not admit of the pavilions being placed on both sides of a central court or corridor, as at the great French hospital at Lariboisière, the hospital at Brussels, or the Herbert hospital, but they all ranged on the river side of one continuous corridor, 900 ft. in

* By Mr. Henry Currey, architect. Read at the ordinary general meeting of the Royal Institute of British Architects, on Monday, 23rd inst.

length. This arrangement has the disadvantage of increasing the length of communication from the several departments, but at the same time it renders the ventilation more free by diminishing the length of the course. The prominent defect of the Lariboisière hospital, viz., the too close proximity of the blocks with reference to their height, has, I hope, been avoided. The pavilions are placed at a distance of 125 ft. from each other (the centre court being increased to 200 ft.), which distance, it was calculated, would admit of ample sunlight and air to every block, the axis of the wards being due east and west.

The general disposition of the building will be seen by reference to the plan of the one-pair story, on which the isolation of the blocks is more distinctly indicated, the intermediate spaces on the ground story being filled in with lower buildings, for purposes hereafter mentioned; and it was my endeavour to make the plan as simple as possible in its arrangements, for facility of inspection and working. Corridors run the whole length of the hospital on the ground and one-pair stories, and connect the several blocks of wards or pavilions. These corridors are lighted by large windows on both sides, and in the event of it being deemed necessary to isolate any particular block, it could be done by putting screens across the corridors, and removing the sashes from the adjacent windows. These corridors are not carried higher than the one-pair story, but the flat roof over forms a means of communication to the several blocks on the two-pair story. The pavilions are placed at right angles to the corridor, from which a passage leads direct to the wards, on one side of which is the staircase. The wards are designed to be 28 ft. in width by 120 ft. in length, and 15 ft. high, and will accommodate twenty-eight beds, giving a cubic capacity for each patient of 1,800 ft. The beds are placed at distances of 8 ft. from centre to centre, and the windows are arranged alternately with the beds, at a level to enable the patients to see out. A cheerful aspect is given to the wards by the end lights communicating with the external balconies towards the river, where patients may be placed on couches or chairs in fine weather. Small wards for two beds, contiguous to, but not communicating with, the general wards, are provided in each block for the reception of special cases, which it may be deemed desirable to separate from the other patients. Adjoining the passage are placed the sister's room, the ward kitchen and a room for the medical officers' consultation. The staircases are wide and easy of ascent, the treads being 12½ in., and the rise 5¾ in. The well-holes are occupied by the large lifts and ventilating shafts hereafter referred to. The water-closets, lavatories, and bath-rooms attached to each ward are projected from the main building, and are cut off from the ward by intercepting lobbies, with windows on both sides. The water-closets, lavatories, &c., have also windows on all four sides, to provide a thorough ventilation. In this department the foul linen and dust-shoots are arranged, communicating with a receiving-room in the basement for external removal. Dormitories are provided for the nurses and servants in the attic story, each having a separate sleeping compartment, care being taken to prevent the ascent of any ward atmosphere reaching thereto.

The main hospital may be said to commence on the first-floor, and consists of three tiers of wards, there being four smaller wards provided on the ground-floor for the reception of accidents, &c. The total amount of accommodation provided is about six hundred beds. The wards have flat ceilings throughout, and the windows are carried up to the ceiling, to ensure a thorough change of air in the upper part of the rooms. From the corridors on ground-floor patients will be quietly and conveniently conveyed by lifts to the various wards (these lifts will be referred to presently); the corridors will also afford a place of exercise for the patients in wet weather, and the covered colonnades adjoining the river will form an agreeable lounge for patients approaching convalescence.

The above description applies generally to all the pavilions, except the southernmost, which is designed for special diseases, inadmissible to the general wards. The wards in this pavilion are smaller, and are arranged for males and females, being separated by a central staircase. The wards on the ground story correspond in general arrangement, but in consequence of the main corridor on ground story being placed next the internal courts, the wards are shortened to admit of the introduction of the necessary rooms in connexion therewith.

The general entrance to the hospital is placed in the centre, and will be approached from the Palace New-road. The entrance-hall is capacious, forming the sub-structure of the chapel, and its dimensions being large, will be found convenient for the reception of the patients' friends at the times appointed for visiting. The steward's or superintendent's offices are placed immediately in front of the entrance-hall, so that everything passing in and out of the hospital will be under his immediate supervision. From each side of the entrance-hall branch off main corridors of communication connecting all the different departments. The ground floor of the first pavilion to the left is appropriated to the kitchen department, as being as nearly central as possible. It comprises kitchen, scullery, and cooks' rooms, with larder, bread-room, &c., on the basement immediately under. A serving-place is provided, where the patients' food will be distributed; it will then pass along the corridor to the different pavilions, and be conveyed up a small lift to the different wards. The ground floor of the first pavilion to the right is appropriated to the matron's department, with a commodious room for linen stores. On the right of the entrance-hall is placed the principal staircase, which leads direct to the corridor on the onepair story, and will be used by visitors to patients, or for the general purposes of the hospital. It communicates directly with the resident medical officer's apartments, which are placed in the central block, consisting of sixteen rooms and a common room. Two operating theatres are provided (communicating with the corridors), lighted from the northern slope of the roof, and of ample dimensions to admit of a large attendance of pupils. A private room is attached to each theatre for the operator, with a second room in which a patient may be temporarily placed after an operation. Conveyance to the mortuary will be provided from the basement by an underground passage, without exciting the patients or the public observation. The dispensary and surgery are placed conveniently for the service of the hospital in the main corridor, and of the out-patients (who are more particularly referred to hereafter), from the opposite side. The lavatory, drug and store rooms, are placed in the basement story, immediately under the dispensary.

All applicants for relief at the hospital will enter at the covered porch in Palace New-road, and will be received in one of the admission-rooms, according to sex; they will then be informed whether they are to be admitted into the hospital or to be treated as "casualty patients," or as "out-patients." If admitted, they will be passed through the hospital corridor to the wards. If "casualty," they will pass to the respective waiting-rooms for males or females, and thence into the male or female surgery. They will procure their appliances at a window immediately contiguous, and pass out at once. If the applicant is to be treated as an out-patient, he will be directed to the out-patient department, which is placed in the corresponding wing. The out-patients enter at a door towards the southern end of the hospital, and pass through a large waiting-room, 110 ft. by 37 ft., in which they will be arranged and classified. The physicians' and surgeons' rooms are ranged parallel with this room. Having been seen by the physician or surgeon, the patients pass into a second room, where they will wait for medicine or appliances from the dispensary and surgery windows, and after receiving them, pass out into the Palace New-road, without entering the hospital corridor. A staircase leads direct from the out-patients' waiting-room to the out-patients' baths, which are provided in the basement. Sufferers from accident arriving will be conveyed directly into the accident receiving-room, and thence, when the cases are serious, immediately through the hospital corridor to the wards, and cases of accident on or in the neighbourhood of the river may be brought to the hospital and received from the landing-stairs.

The administrative offices are placed next Westminster Bridge, and approached therefrom; they will comprise the governor's hall, committee-rooms, almoner's-room, counting-house, receiver's-room, strong-room, waiting-rooms, and offices for the clerk and surveyor of the hospital, the treasurer's residence, &c. A staircase will connect the treasurer's house with the main corridor of the hospital. The two lower stories of this block will contain residences for porters. Four houses are provided for resident officers, containing eight rooms each, exclusive of domestic offices. They will be approached from the Palace New-road, and communicate in the rear with the main corridors of the hospital. For the last eight years, nurses selected by Miss Nightingale have been trained (the governors believe with great advantage to the public) in St. Thomas's Hospital; and in the design for the new hospital provision has been made for an increased number. The training institution adjoins the matron's residence, and will afford accommodation for forty probationers, who will be trained to the hospital wards for the council of the Nightingale Fund. Each probationer is provided with a separate sleeping apartment, ranged round a central gallery, with all necessary bath-rooms, &c., and a large day and dining room on the ground floor.

The chapel is placed in the centre of the building, communicating with the corridor, with convenient access for both sexes. The school buildings occupy the southern end of the site. They consist of a large museum, 85 ft. by 30 ft., and 34 ft. high, with two galleries, a museum for chemistry and materia medica, medical, anatomical, and chemical lecture theatres, library and microscope room, dissecting and *post-mortem* rooms, chemical and pathological laboratories, &c., affording the medical student opportunities rarely if ever equalled in completeness. The extreme point is occupied by gardeners, sheds, stables, &c.

The new wall enclosing Lambeth Palace grounds was built at the expense of the hospital in exchange for certain pieces of land surrendered by the late Archbishop of Canterbury to improve the boundary of the hospital site.*

TREATMENT ADAPTED TO MATERIAL †

Iron.—Let us first take *wrought* iron, for the artistic treatment of iron must be guided by its finest capability; and that is to be found in its readiness, under certain conditions, to receive the direct impress of the worker's hand.

We have, then, a material of a dark colour, and which, under ordinary conditions, does not exhibit bright high-lights. A vigorous treatment and strong indentation are therefore demanded for detail. Its liability to corrode prevents any reliance on the effect of fine surfaces. It possesses, when being worked, considerable ductility, of which the workman must avail himself fully; also great elastic strength, which permits it to be bent or twisted extensively without frequent support. These qualities allow of very acute sections, sharp mouldings or narrow fillets, all of which will be found expressive; but the finer the sections the more careful must be the finish. Excellent specimens of wrought-iron ornament are numerous enough among country inn sign-brackets and the balustrades and gates scattered about the country, all dating prior to the present century. The "Hampton Court" gates (not long since removed to the Kensington Museum) are splendid examples of what may be done with the smith's hammer. At the same time, I am disposed to doubt the desirability of working the ornament to such a paper-like thinness in a material which corrodes so readily as iron.

Cast Iron may be considered, for art purposes, an abnormal material. Yet its extensive use obliges us to consider what rules should guide our treatment of it. We must regard its conditions as somewhat similar to those of bronze, without the latter's capacity for high finish. The coarse surface resulting from the casting is destructive of delicate detail, nor does it readily admit of subsequent finish. The character of the detail must therefore be regulated by the nature of the surface as it comes from the mould, and should be adapted to the requirements of casting. If these conditions are carefully studied, very satisfactory results may be obtained. It is only when *cast* iron affects to imitate wrought iron, or some other substance, that it fails, disagreeably, to take its right place as a valuable material.

Bronze may, perhaps, be considered as occupying the foremost place among metals for purposes of art. Its close texture admits of the highest finish, resulting in softened high lights, the most favourable for the display of surface form. It, therefore, lends itself admirably to either delicate or vigorous relief. The effect of the relief is often heightened by the brightness

* To be continued. † See p 40, *ante*.

of the metal where its prominences are subjected to abrasion.

Although, like cast-iron, it is turned out of a mould, it differs materially in more than one respect. It has not the hard brittle nature of cast-iron, but, on the contrary, is, to a certain limited extent, ductile and elastic,—qualities which enable its treatment to resemble more nearly that of wrought metal when such is deemed desirable. But beyond this it is admirably adapted for receiving finish at the hands of the *chaser*, who may expend upon it with advantage almost any labour or care that the size or nature of the object admits of.

Perhaps no material is so effective in work, both small and large. From the great gates of the Florence Baptistery to the minute medallions wrought by Japanese artists, bronze seems equally to lend itself to the object, and equally to satisfy the just requirements of art. In the latter instance it has received the highest conceivable finish; in the former, only so slight a finish as the large scale and exposed situation require. But in all cases, and whatever the size of the work, the plain surfaces should be carefully finished, so that the spectator may recognise the fine texture and beauty of the material. For the same reason, the contour of mouldings should be refined, and should be relieved by acute arrises or fine fillets. True, the dark colour makes requisite deep cutting and bold modelling where emphasis is necessary, or where the parts are in shadow; but even here coarseness must be carefully avoided, and the sharpest finish given to all *edges. A dull, blurred edge is destructive of metallic effect:* and herein lies one of the leading causes of failure among our London examples of bronze statuary. One and all, they *never get beyond the clay* in which the model was designed. Turn from these to such works as the equestrian statue of Colleone at Venice, or the great kingly figures which stand round the tomb of Maximilian at Innsbruck (full-size copies of these are in the Crystal Palace). What a contrast! I defy the idea of plastic clay ever to enter one's head when regarding these examples. Apart from the magnificent vigour of their design, there is a *metallic finish* about them, bold though it be, from head to foot. Sharp edges are preserved both in outline and detail, giving an unmistakable sparkle and spirit to the whole, which would be entirely lost were these sharp lights rounded down or "smeared" away as we see them in Trafalgar-square examples.

Can anybody point to a single London statue (saving Charles I.) which might not just as well have been cast in iron as in the exquisite material of which they display such a profound unconsciousness on the part of the artists? Take our most recent and most valued acquisition, the "Nelson lions." Where do we find the spirit of bronze? Where are the crisp, bright lights and the sharp, deep cuttings, or the silky gleam of surface which all speak of metal? Not in the mane assuredly! Yet how valuable would have been the bright streaks of light in explaining the intended object. Look at the paws! How innocent of everything but the marks of the tool, *not with which the bronze was finished*, but with which the *clay* was moulded, all too faithfully reproduced in the casting. Had they been of terra-cotta, these modellers' toolings would have been well; but when we are working a valuable metal, the wretched sand or clay which we may happen to use in the process should be unknown to the spectator. It is not the ready, but "smeary," moulding-tool that should be evident, to remind him that this is but a *costly reproduction from a baser model;* but it is the sharp file and the keen graver, the skilful handling of which he is to recognise. It is the ultimate work, the *finished, hard, gleaming metal*, which is to show the artist's hand. The *clay*, and all that belongs to it, have no more business to be seen than the painter's lay figure.

Herein lies the gist of all that I am trying to say; and, half against my will, I have selected this example, the noble design of which I thoroughly appreciate, precisely because its excellences are apt to lead the student to forget its defect—*material ignored.*

In such bronze objects as include the use of mouldings these should, as I have already said, present fine profiles. By this I do not mean that the actual size of the mouldings need be limited, but that the flow of the lines should be such as to present gradual and softened curves where broad lights are required, the edges being kept sharp, and the shadows dark and well defined. To this latter end we often find, in the best works, the moulding highly concave in its under side; by which means the bright, sharp edge is brought sharply against dark shadow.

Examples of this are frequent among the elegant candelabra and other objects found at Herculaneum and Pompeii. We may also observe in these works how the mouldings are, here and there, wrought to an extreme tenuity, thereby assisting the eye to recognise the tough strength of the metal. Occasionally, too, much delicacy is given by the occurrence of very fine fillets,—mere threads, upon the profile.

For examples of excellent treatment of ornamental work in bronze on a large scale we may take Allessandro Leopardi's grand standard sockets at Venice. In them we find the boldest treatment of contour or form combined with a masterly finish of the detail.

Modern French sculptors and artists have well studied the effects of bronze as a material; which, indeed, may be considered the one which, of late years, the French have most completely made their own. Simply because their artists and workmen are at the trouble of studying their material, and adapting the nature of the treatment to the due expression of its character. Before passing to the precious metals, we may pause for a moment to consider that exquisite works have been produced by François Briot and others in so common a metal as pewter. So ductile a material is, of course, very readily *repoussé*, and the subsequent chasing is much more easily executed than in the harder metals. Lead or pewter is used for the finished models from which the smaller kinds of ornamental details are cast in brass or bronze. These models are often far more beautifully finished than the greater part of the work cast from them, and there can be no question that these substances offer great facilities to the artist. The drawback is, that their softness renders them very liable to injury; so that it becomes a question whether a harder and more valuable material does not repay the additional labour demanded.

In silver we have a metal which, apart from its intrinsic value, possesses many qualities valuable to the artist. It is far more ductile than bronze, and at the same time has natural hardness sufficient to resist any ordinary risks of wear. This hardness may be increased by alloy. In addition, it is exceedingly durable, and admits of the highest finish. It is also open to two distinct methods of treatment, which may be used separately or in combination. If polished or burnished, its whiteness and strong high lights preclude delicate work in the detail. At the same time these qualities result in considerable splendour of effect when boldly treated; especially in objects which are made to depend upon form in such a way as to exhibit the burnished surface to advantage. Bold "bossed" work is very effective, and may be used with excellent result either alone, or in combination with engraving or *repoussé* relief. A matted ground is then valuable to the latter. Engraving, to tell well on bright silver, must be pretty boldly executed. The lines are otherwise lost in the overlapping, refracted rays of light shed from the surrounding surface.

For art purposes the most favourable form of silver is that known as "oxidised," in which the extreme whiteness and brilliancy of surface are subdued. It then possesses the finer qualifications of bronze in a higher degree, and the light grey colour which it presents, together with a fine surface, and softened lights, renders it the best of all materials for delicate and highly finished relief. In fact, the chasing may be as fine as the artist can bestow; nor need he fear that his labour will be lost.

Many valuable modern works have been executed in this country, though by foreign artists, and some excellent reproductions have been made in *fac-simile* by the electrotype process. The most beautiful modern specimens of *repoussé* silver, however, which I remember, were exhibited in 1867, by Fannière, of Paris, who, in a table service (said to have been designed by an amateur for his own use), combined excellence of form and design with most admirable treatment in execution. It is satisfactory to find that one of the English artizans, whose reports were published by the Society of Arts, appreciated the remarkable excellence of the works from this *atélier*. "Other exhibitors," he says, "show some good pieces; but in Fannière's case, I think it is impossible to discover one piece of inferior work, while many are real masterpieces."

Party gilding and "damascening," may both be used on dull silver, with good effect, the main point to care for being to avoid confusion.

Engraving may be used with both, and, if the surface is not polished, may be as fine or as elaborate as may be desired. A hatched or matted ground, judiciously used, often adds greatly to the effect, of low relief, or may sometimes be used to show a flat ornament with engraved outline.

Gold.—The most valuable and the handsomest of the natural products in general use, is, by reason of its powerful colour and strong lights, not very favourable to the display of delicate modulations of surface.

In large objects, highly bossed work, bold relief, or low relief set off by a mat ground, tells well; as also does engraving, whether fine or bold.

Whilst possessing great strength and tenacity, it is extremely ductile, and in its native state bends very readily. These qualities sufficiently account for the extent to which the ancient and Oriental goldsmiths used fine twisted wire in the ornamentation of their jewelry. Angular or very sharp sections are not desirable; the latter giving a hard, steel-like character to the subject, whilst thick, square edges have a "stony" effect. Slightly rounded edges, and tolerably bold profiles seem best to suit the characteristics of gold. Very thin, sharp edges seem to detract from the value, and look poor. Very fine relief, rising abruptly from its ground (as the wire ornament already mentioned), always tells very happily in gold, because, although ever so delicate, it provides itself a fine outline; and this is what gold always seems to demand. On this account *repoussé* work in plain gold must always rise more suddenly from its ground than would be necessary with bronze or dull silver; but, being once provided with this natural outline, the execution of the raised work should be rounded and soft, *not* abrupt and angular. Anything like *abrupt contrast* of light and shade will detract from the effect of work in gold. A certain *repose* is essential to the solid beauty of the material, so long as we are depending on the solid gold alone. If, however, we are merely using the gold as a setting for some more precious object (such as jewels), the rule may be modified.

So far I have been speaking of gold having the fine dull surface natural to it in its native state. For almost all art purposes this is the most agreeable finish. At the same time, we must not ignore the burnisher, which, when used with judgment, may produce excellent effect by contrasting the bright and dull surfaces, and so giving special emphasis to certain parts of the design. Burnished gold alone has rarely so good an effect.

Gold has the peculiar property of *harmonising colours*. It does so to an extent that only those who have tried it can believe, and at the same time clears and purifies each colour that it surrounds. Precious stones are, therefore, always seen to advantage in a gold setting; and both they and coloured enamels may be used to give point to the design, even when they are only employed with that secondary intention.

Gilding.—From gold to gilding is an easy transition. Gilt metal may be considered as, in the main, subject to the same rules as gold; but the same delicacy of treatment and high finish are not demanded. The relief must always be strong enough to clear itself unless it be assisted by the burnisher, of which a more free use may be made.

Gilding on wood, or other similar material, may be made more or less effective, by judgment in execution, to a far greater extent than would at first sight appear. The judicious disposition of the burnish may make or mar the whole piece. Surfaces which are much cut up should never feel the burnisher, which should be confined to such parts as present an evenly-rounded or flat face. The burnished parts should always be so placed as to assist in expressing the design. Carved surfaces should be in *dull* gold; and care taken that the "preparation" does not smooth away all spirit from the work. When only a portion of the object is gilt, and the remainder shows wood as its material, I prefer that the gilt parts should also exhibit the texture of the wood.

The same rules which we have been applying to the treatment of ornament in the solid apply, in a different way, to the coloured treatment of various surfaces. Here, similarly, the eye must be judicially led to forget the imperfections of the material where it is imperfect, or to value its excellence if it be excellent. A rough or irregular surface of wall must, in the first place, be *absolutely without gloss*, and its decoration must then be so carried out as to lead away from the consideration of surface. Continuous

straight lines, or fine curves, are to be shunned; nor is delicate finish desirable. A certain breadth of effect and execution must be maintained, and the forms of ornament selected must be such as not readily to betray the slight distortions caused by uneven surface, but to lead the eye to follow the intention of their own forms. On the other hand, where the wall presents a singularly fine and perfect surface, this may be done justice to and explained, firstly, by making the coloured grounds carefully even in tone and texture. It may even be thought desirable to maintain a slight gloss, but this must not be excessive. Fine detail and straight lines may be used to any extent required, and the finish need only be limited by the skill of the artist. In this, however, a distinction must be observed as to the execution of those parts which are mere ornament, and those which partake rather of pictorial art. The former are intended to add to the general effect of the room or building, and should, therefore, be executed in such a manner as to explain themselves, and answer their end when viewed as part of the whole. However finely executed, the lights must be sharply preserved, and *not toned off too gradually to the shades.* A certain crisp, solidity of touch, with a precision of intention, are indispensable, though they need never become obtrusive.

I cannot do better than point to the decorations of Pompeii for examples of the execution of decorative ornament,—on a fine surface.

When, however, pictorial art is introduced, I am far from desiring to limit the finish or to dictate the style or method of execution. The artist will of course comply with the condition that the general tone of colouring and force of effect be such as to harmonise with the rest, and assist the general result. Having done this, it remains with him alone to decide whether his work shall be most admired at a distance of one yard or five. It occupies the position of a gem in a fine setting, and invites admiration on its own account as well as by adding to the value of the whole. Yet, even with this freedom, the painter who has never painted for any surrounding but a gilt frame will find that he has much to learn before he can satisfactorily ally himself to the architect.

Stained Glass.—We have been considering how far the treatment of coloured ornament may be varied to meet the necessities of the surface to which it is applied: the variation being rendered necessary by the way in which the light, falling on those surfaces, affects the appearance of their ornamentation, and *vice versâ*.

We have, however, in *stained glass windows*, coloured ornament applied under totally different conditions.

In wall treatment, we had to explain the surface; but here we have nothing to do with surface, of which the eye can take no knowledge, the light being transmitted. It can, however, take note of outline, form, and colour; therefore especial care must be taken in respect to these elements of beauty. The *leading* forms must not only in themselves be pleasing, but must be so clearly defined as to be distinguished in spite of the flood of light which pours through, the rays of which spread and overlap each other.

But it is in dealing with the question of colour that the treatment of stained glass is really put to the proof. We have not only to arrange our colours harmoniously, but to make the most of our beautiful material. It is in the jewel-like brilliance and play of colour that the great charm of stained glass lies, and our study should be to enhance, as far as possible, this special beauty. If we observe carefully the best works of the old artists in stained glass, we shall find that one important means to their success lay in the skilful use which they made of the *irregularity* of their materials. *With colours obtained by transmitted light, those appear richest which vary most in depth.* This is an axiom which workers in translucent material (be it glass or enamel, or what not) should never forget. It is their first condition of success. Such homely illustrations as a decanter of claret, or a spoonful of currant jelly on a white plate, will explain my meaning as well as any.

If the wine were in a flat vessel of uniform depth, the colour would be there, but half its rich play and flashing glow would be gone; for it derives these from the varied diameter of the vessel. So with the jelly, the colour of which is displayed (as in enamel) by the light reflected from its ground, the plate. If spread in an even coating, the colour is still beautiful, but the rich palpitating effect is no longer there.

In large spaces of one colour, the mass should be made up of several pieces of varying depth. In small spaces the varied thickness of the glass itself must be depended on; and where, as in a border, the same colour is repeated to a considerable extent, so far from *matching* each piece to the other, the skilful artist will seek how to *vary* them with most effect. Many of our best glass artists are well aware of this; but until the workman himself appreciates and understands how thus to give value to his work by studying his material, advance will be slow. Still, in knowledge of their material, the English stained-glass workers of to-day surpass all their foreign rivals. Whatever excellence of pictorial design the much-vaunted "Munich" windows may possess, they betray absolute ignorance of the treatment of material. They are mere transparencies, and, but for their greater (almost unfortunate) permanency, might just as well be painted on oiled canvas as on glass, of which they exhibit not a single characteristic.

We have now glanced at several of those materials which are in most general use for the purposes of art, especially of such arts as are most closely allied to architecture. In thus rapidly surveying the leading peculiarities of each material, I have endeavoured to point out that, although much may be done in the *design*, much also remains in the power of the artist or workman under whose hands the crude, lifeless material is wrought into the living treasure. It lies with him, not only to do justice to the conception of his own or another's brain, but, in so doing, to seek for all the assistance and all the power of expression which he may derive from the substance which he has selected from the rich gifts of his mother earth. J. D. CRACE.

YEOVIL AWAKENED.

"'Tis the voice of the sluggard. I heard him complain:
'You have waked me too soon, I must slumber again.'"

AFTER five or six weeks' hibernation, the Yeovil Board of Guardians has hatched a report in answer to the facts stated in our article of December 17th. As may be seen from the report of the committee appointed to investigate our statements, these gentlemen confine themselves almost to a simple denial of our charges, and they appear to be in nowise interested in challenging us to the proof. Not at all: quite otherwise.

"The commissioners (*sic*) do not recommend the Board to take any further notice of the anonymous attacks upon it in the article contained in the *Builder*."

Before we make good our statement, let us give our readers the benefit of part of the report:—

"The committee appointed by the Board of Guardians, on the 28th of December, 1870, to investigate the charges contained in an article, which appeared in the *Builder*, on the 17th of December, headed, 'Yeovil, wake up!' with power to examine any books and papers belonging to the union which they may think proper, and also to call before them any person or persons who, in their opinion, may be able to give information as to the truth or otherwise of the statements made in such article, and that such committee report to the Board the result of their inquiries on this day fortnight, met on the 4th of January, 1871.

From the best investigation they can make, the committee have failed to discover a single case where able-bodied youths had been kept for several years in the house lazily squandering away their time from youth to manhood, and at last thrown out upon society, unable to follow any useful occupation; or when any treatment on the part of the guardians has tended in any way to promote the rearing up of such youths to criminality.

It is true that an accident occurred in the house about fourteen years ago, by which a child, aged three years, died from the effects of burns; the accident having occurred although a fire-guard was at the time of the accident placed before the fire in the room. Mr. Stone, the master, is prepared to prove that the whole of the paupers have had a change of linen regularly and systematically at the least once a week, and a pair of clean sheets fortnightly. The master has supplied, and Mary Elizabeth Hibberd, the nurse, will swear, if necessary, that the sick paupers have had, the wine, spirits, and beer which had been put down to the workhouse expenses. Dr. Aldridge says he has no reason to suppose that the paupers for whom he ordered extras (*i.e.*, wine, spirits, and beer), did not get the supplies so ordered. He has never had any complaint made to him by a pauper."

Will the Board of Guardians or the committee venture to deny that a youth, twenty-two years of age had been in the Yeovil Workhouse since he was two years old? Twenty years out of his twenty-two had been thus lazily squandered, but giving the juvenile a ten years' benefit for his tender years, what have the guardians to show for the surplus time?

Another boy of sixteen, who ought to have been apprenticed to some trade, or put to farm work, had spent six years in the Yeovil Union. No wonder that one of the guardians should remark last year, "that the Board, by their action, were squandering the ratepayers' money." The two young hopefuls we have alluded to cost the union nearly three hundred pounds for their lengthened board, washing, and lodgment. Early last year there was such a large number of boys in the workhouse, that a correspondence was advised to be opened with the Admiralty with a view of sending them into the navy; a second party were for apprenticing them to trades; and a third were for putting them out to field labour. In the meantime little or nothing was done to teach those able-bodied boys how to earn a living. With the training they received in the Yeovil Union, they would be a curse either to the army or navy, until the terror of the "cat-o'-nine-tails" made them look alive. We have one quarter's account of the consumption of stimulants before us. This account relates to a period previous to the visit of the Poor-law inspector. Item, 1,039 ounces of brandy, 1,112 ounces of gin, and 737 pints of porter. This is the quantity returned as ordered by one of the medical officers of the union; but another medical gentleman in the environs of the town assured us that these quantities were never consumed by the pauper inmates.

It is of small consequence what the present master of the workhouse or *one* of the nurses may be prepared to swear: we are prepared to prove that the officers in the union have undergone a change; that the nurses and schoolmistress, as well as some of the paupers, have been refractory, and had to be remonstrated with for acts of insubordination, but that they continued despite, for a long time, to do as they pleased. The expenditure per head for food was under two shillings a head; some years ago it did not amount to one and sixpence. The late master having decamped, cannot be brought to book, and it is very handy now for the guardians to throw the late evil condition of the workhouse upon his shoulders. Now, what did a late visiting committee report to the Board?—"That the union was in a disgraceful condition," and that they were obliged to order new bedclothing; and did not one poor old creature confess "that she had not had a change of clothing for *ten weeks?*" In the face of these gloomy facts, the reporting committee have the bravery to say that the paupers have had a change of clothing regularly. Have there not been between twenty and thirty pounds expended yearly for wine for children "between the ages of six months and two years?" Who were the wine-bibbers or tasters besides?—Mum.

Here is another fact, worth fifty assertions, showing the value of the training in such unions as Yeovil. Last autumn a member in a town-council not a hundred miles from Yeovil read a letter from a young man then in Bristol Gaol. The substance of the letter went to show that while the writer thanked the gentleman to whom he addressed his letter, and the union to which he formerly belonged, for treating him with kindness, and teaching him how to read and write, yet he deplored that the union should have turned him out without teaching him any useful occupation or trade by which he could gain his living. To this cause the convict attributed his falling into bad company, and being tempted to rob.

Here was a lesson before the Yeovil guardians to profit by, if it did not immediately concern them,—but it did.

The authorities that keep pauper youth for years, half educate them, and finally turn them out upon society at an age when they should have nearly mastered some useful form of skilled labour, are guilty, to say the least, of very reprehensible conduct.

ART-WORKMANSHIP: SOCIETY OF ARTS.

THE specimens sent in response to the offer of medals and premiums made last year by the Society of Arts, and which are now exposed in the lower room of the Society's House in the Adelphi, are sixty-three in number, besides some twenty works submitted by Messrs. Cox & Son, with the names of the workmen who produced them, but which, for the convenience of the Society, are retained on the manufacturers' premises. Had other art manufacturers and artists,—such, for example, as Messrs. Jackson & Graham, Messrs. Hart & Co., Mr. Phillips, Mr. Collmann, Messrs. Clayton & Bell, and more that we could name,—acted similarly, they might, we have no doubt, have secured medals for themselves and money-rewards for their best men, besides facilitating the

admission of some of their works at the approaching International Exhibition, had they so desired. However, they have not done so, and, as it seems to us, have missed a chance. The Society generously laid themselves open to a very heavy pull on their finances, and were prepared to abide by what they had offered; whether they will repeat such liberal proposals remains to be seen.

As we shall probably think it right to print the names of all the rewarded competitors, we will confine ourselves at this moment to mentioning a few of the best works. No. 12, an Amboyna wood inlaid loo-table designed and executed by Thomas Jacob, assisted by Cornelius Rich (marquetrie-cutter), Charles Helfer (engraver), and others, is an unmistakably good work, and will doubtless obtain premiums for those concerned. No. 38, one of a pair of wrought-iron gates executed for the Union Bank of London by T. Winstanley, from the design of Mr. F. Porter, is an equally meritorious production in another department. G. Winstanley and F. Lancester, his apprentices, helped, and should have some of the reward. Another remarkably good exhibit includes Nos. 22, 23, and 24, portions of friezes for rooms, designed and modelled by J. Daymond, jun., under the direction of Mr. A. Salvin. No. 10, a dead pheasant, from nature, shows much technical skill. No. 14, a cabinet, in mahogany and ebony, displays some carving creditable to W. M. Holmes and W. Maskell, but as a whole, both in design and execution, falls short of excellence. No. 20, figure of a child dropping off to sleep, by J. W. Gould, is remarkable—perhaps too remarkable—for its likeness to nature. The steel-bladed trowel damascened, by T. R. Rice, is technically excellent. Two hammered brackets in iron, by W. Morris and W. Robson, respectively, and some works in copper, *repoussé*, by R. Tow and W. Theuerkauff, deserve commendation; and the same may be said of some specimens of glass-blowing executed by E. & T. C. Barnes. J. Ronca sends an elegantly cut cameo or two, but they are not equal to others that he has done.

The specimens submitted by Messrs. Cox, include some silversmith's work, part very good, a brass eagle lectern, a wrought-iron gas standard, a wrought-iron pulpit, and a font-cover of oak and brass, all deserving reward in one respect or another.

METROPOLITAN RAILWAYS, TRAMWAYS, AND MISCELLANEOUS IMPROVEMENTS FOR SESSION 1871.

THE basis of a map on which new railways, tramways, and other improvements within the metropolitan area are shown from year to year, need not necessarily be much changed from one year to another; but the coloured lines and patches, indicating the sites of proposed improvements, and the courses of proposed railways and tramways, necessitate numerous and elaborate alterations. Mr. Stanford, of Charing-cross, publishes annually a map, in anticipation of the Parliamentary session, in which the new schemes for which plans have been deposited at the Private Bill Office, are embodied. This map for the coming session is just published, and is as usual, upon an excellent map of London and its suburbs, extending north and south to beyond the five-mile radius from Charing-cross, and east and west to a considerably greater distance. It is necessary every year to have extra and entirely new work in one or more of the corners, to show the terminus of a new metropolitan railway or tramway, or the situation of some other work; as, for instance, this year corners have to be filled up to show the terminus of a tramway at Watford, of a railway at Edgware, and of sewage works at Beckenham.

In the new map railways and miscellaneous improvements are indicated in red colour, and tramways in blue; authorised lines, not yet opened, are dotted, in the case of both railways and tramways, and new schemes by continuous lines in the respective colours. Among the new railway schemes the most decided novelty is Mr. Rammell's proposed pneumatic line, of 6 furlongs in length, between Cannon-street and Broad-street stations. A number of the stations in various parts of the metropolis, and a portion of the proposed coal-owners' line are shown, but the greater portion of the works of this scheme are far north of the metropolitan area. The Eastern Metropolitan line of two miles and a half is an underground project, revived from last session, concerning which little need here be said. The East London is for deviations. The Euston, St. Pancras, and Charing-cross, has a main line and three branches, in all 2½ miles, and is probably the most important metropolitan scheme of the session. The Fulham, Hammersmith, and City, of 2 miles, is another revived scheme. The Harrow, Edgware, and London, is a short branch, of a little over a mile in length, from the Midland line to Edgware. The important project for a grand terminal station on the Holborn Viaduct, has been noticed already in the *Builder*. The London and North-Western Company have a Bill for station works at Euston. The Brighton Company propose a short branch at the Commercial Docks for goods traffic. The Metropolitan and St. John's-wood Company proposes three short branches, of a little over a mile in all, one of them an extension to Kilburn, and another to Finchley Station. The Midland has an Additional Powers Bill; and, in conjunction with the Great Eastern, a branch line of 2 miles 5 furlongs to Alexandra Palace and Park. The North London has a Bill for a Station at Highbury. The South-Eastern Company has a Bill for a deviation in their authorised Greenwich and Woolwich line, which they ought to be exempted from making under the altered circumstances of the locality. These are, in brief, the whole of the railway schemes proposed in the metropolis.

The miscellaneous improvements embrace Powers Bills in connexion with Brixton Prison, the new Courts of Justice, the new Mint building site, and the Record Office; also schemes for the enlargement of Billingsgate and Leadenhall Markets, Knightsbridge Improvement, and improvements of Hampstead Heath, Leicester-square, and at Shoreditch. The other miscellaneous improvements are for sewage works at Beckenham, new works by the Hornsey Local Board, and by the Gas-light and Coke Company.

The tramway schemes, twenty-one in number, embrace 376 main lines, loops, branches, and extensions. It would be much easier to enumerate the thoroughfares and localities that are *not* proposed to be used than those that are. The total mileage of new tramways proposed for the metropolis is about 250 miles, in addition to the lines already at work, and about 100 miles already authorised, but not yet constructed or opened. The proposed extensions on the south of the Thames are inconsiderable in extent; but on the north side it may be said with truth, that there is no thoroughfare, north, south, east, or west, that the promoters do not propose to appropriate. One Bill, or rather the plans, embraces about 45 miles; another above 40 miles; and one company, the London Street, schedules about 60 miles of streets and roads. The plans of two sets of promoters, the Common Road Conveyance Company and the Southall, Ealing, and Shepherd's Bush Tramway, the one of 12½ miles, and the other of 7 miles, were not lodged at the Private Bill Office. Whether the promoters will receive a dispensation from standing orders remains to be seen.

The reference numbers on the map are not in all cases perfectly legible, and the legibility and clearness are further impaired by the novelty of duplicate numbers, which it was necessary to introduce, the plans, in five instances, having been lodged as connected with a private bill to be promoted in the ordinary way, and also as connected with a petition for a provisional order, in accordance with the Tramway Bill of last session. In some instances, also, there are competitors for the same line. It is more than probable that at the end of the session a map showing the tramways authorised in the session of 1871 will require the application of the sponge to three-fourths or four-fifths of the blue lines now shown. It is possible to have too much of even a good thing; and tramways are not good things in all positions.

THE METROPOLIS SEWAGE AND ESSEX RECLAMATION COMPANY.

AT the last meeting of the Metropolitan Board of Works, the Works and General Purposes Committee presented a report relative to the intended application to Parliament by the Metropolis Sewage and Essex Reclamation Company for a variation in their authorised works. The engineer had drawn up a report on the mechanical part of the scheme, which the committee recommended the Board to adopt and refer to the Parliamentary Committee. The engineer was of opinion that the work could not be carried out within the estimate. Apart, however, from the mechanical portion of the scheme there are (said the committee) in the statement submitted to the Board by the company on the 18th November last, some points to which the committee think it desirable to direct the notice of the Board. Starting with the assumption that the scheme of 1865-6 for conveying the northern sewage from Barking to the Maplin Sands is, under present circumstances, financially and commercially impracticable, and at the same time that the only method by which large quantities of sewage can be effectively and profitably dealt with is by using it for the irrigation of land, the directors of the company proceed to state that, in reviewing their position, they have come to the conclusion that in the absence of sufficient practical evidence of the agricultural value of the sewage to induce land owners and occupiers to incur immediately the expense of preparing their lands for its application, and of any reliable criteria of its saleable value, it would be hopeless to attempt to carry out at present any project for dealing with so vast a quantity as 275,000 tons per day without direct financial assistance from the Board. With such assistance the directors consider that the modified works described in their letter, and now reported on by the Board's engineer, could be executed, and a profitable mode of disposing of the sewage carried into effect. The company's estimate of the cost of the scheme is 800,000*l.*, exclusive of the expenditure already incurred. The annual expenses are set down at 33,050*l.*, and the cost of purchasing Canney Island is estimated at 200,000*l.* In the Bill which they propose to introduce, the directors have embodied the views expressed in their letter on the question of the financial assistance which they desire should be given to the company by the Board; and it is this point to which the committee desire now to call special attention. By clauses 31 and 32 in their Bill, the company propose that the Board should contribute to the undertaking and guarantee the payment of interest or dividend upon any shares or stock (including debenture stock), and the principal of, and interest upon, any debentures or bonds to be issued or granted by the company, either absolutely or for any specific period, and hold shares or stock of the company, and lend and advance money to them upon such securities as may be agreed, and for that purpose create additional stock to the amount of 1,000,000*l.*, under the Board's Loans Act of 1869. The introduction of any such clauses as the foregoing would, the committee think, be highly prejudicial to the interests of the Board, and the committee feel sure that the Board would be strongly opposed to any application of the rates of the metropolis to the purposes of a public undertaking. After a most careful consideration of the whole subject, the committee recommended that the company be apprised that so long as they require the Board's guarantee, the Board will not be prepared to assent to the Bill promoted by the company.

Mr. Runtz proposed the adoption of the report.

The proposition was seconded, and after a brief discussion, carried *nem. con.*

Mr. W. Hope, observing that the Metropolitan Board of Works had dismissed with ridicule the proposition submitted to them by the Metropolitan Sewage Company, and being originally responsible for the creation of that company, has addressed a letter to the Board disclaiming responsibility for the present proceedings of the company. Mr. Hope says in this letter, "The statements of the company in the preamble of their Bill are altogether opposed to the real sober facts. The farmers of Essex are anxious to obtain the sewage; and the company, for reasons which are now obvious, has refused more than once to sell it to them. . . . . I took them an offer in the autumn of 1869 from parties who were competent and willing to carry out the enterprise. These gentlemen were prepared to find all the money that was necessary, and to complete the works within eighteen months; and the estimate for such completion was 500,000*l.*, whereas the company now ask from the Board a payment of no less than 800,000*l.* for the same works."

The Victoria (Philosophical) Institute. The second meeting of the session will be held at 8, Adelphi-terrace, on Monday, the 30th inst., at eight o'clock, when the Rev. J. Titcomb will read a paper on "Archæology and some of its Parallels and Contrasts," illustrated by diagrams.

THE STATE OF WAPPING ISLAND.

OUR observations have, at any rate, awakened attention, and may, it is to be hoped, do good. At the last meeting of the Vestry, St. George's-in-the-East, a report from the health officer, on the recent article in the *Builder*, was read. Dr. Rygate observed:—

"That several of the matters referred to, such as tumult, wife-beating, oaths, &c., were not within the province of the Vestry to interfere with, though they, no doubt, led up to the 'sorrow, suffering, and sickness' complained of, and they all implied improvidence and recklessness of decent house-accommodation, and would lead to the other evils which come more directly within the province of the Vestry. It would be a source of satisfaction to the Vestry and Board of Guardians to know that not a single death occurred in either of the places complained of from zymotic disease during the whole of last year. Cases of the kind had, of course, occurred; but they had been as speedily as possible isolated. To the unusually good wages earned by many of the working classes in that part of the parish, and the food obtained therewith, he had no hesitation in attributing much of this immunity from disease and death. Dr. Rygate had in his possession figures obtained by the peculiar tact and sagacity of the sanitary officer (Mr. Pritchitt), which showed that eight persons living in nine of the houses closed by order of the magistrate, had earned, in the eleven weeks from November to January 14th, an average of 1*l.* 12*s.* 7*d.* each weekly. The damage done by this class of persons to their houses was grievous to witness. The houses were repeatedly under notice. The owner had been summoned, and an order for sanitary repairs obtained, before they were closed; and for weeks the agent had never been near them for rent. The ashes and night soil on the steps in front of the houses, as described by the writer in the *Builder*, would alone suffice to show the habits of the people, as the houses had capacious yards in the rear."

The worthy doctor's report is not altogether satisfactory. At the period of our visit, there were several persons lying in sickness, two deaths had occurred, another was hourly expected. In an upper room of one of the nine houses which were closed, one family were allowed to remain, in consequence, we believe, of a very bad case in the room, which it was thought dangerous to remove. The sentence, "Eight persons living in nine of the houses" may mislead if we do not state that the majority of the houses in the court contained from three to four and often more families in each.

A NEW THEATRE FOR DUBLIN.

DURING the last twenty years several attempts have been made to establish a new theatre in Dublin. The promoters in some instances had no money, but hoped to make it; and the promoters, in other instances, had already made money, and were willing to lose it. The lessees of the two existing theatres, viz., the Theatre Royal and the Queen's Royal Theatre, always gave a most determined opposition to every application made for a patent for a new house. Opposition, however, was conquered at last; and one of the successful promoters, who is in the music line, will also possess, we believe, the chief interest in the concern. The new structure, for which a patent has now been obtained, will be situated in Grafton-street. Tenders for its erection are advertised for. It is to be named the New Gaiety Theatre, and it is to be constructed to contain fully 2,500 persons. Dublin audiences are very exacting; they like good music and good acting, yet they do not give that continuous and hearty support to the drama that is desired. For many years Dublin has only half supported her two regular theatres, and the most fashionable one of the two (which, by the way, is situated at the entrance of a most unfashionable locality), is only open at certain seasons.

If the New Gaiety Theatre is intended to be a success, novelty will need to be combined with worth. The new theatre in Dublin cannot be looked upon in any other light than as a bold experiment, and though it may deserve success, it may fail for sundry reasons to command it. Ireland is not more difficult to govern than Dublin audiences are hard to please.

NEW TOWN-HALL, THURSO.

SOME time ago an esteemed citizen of Thurso, Mr. Alex. Henderson, left 1,000*l.* towards a new town-hall, having a room for the commissioner of police, and a library or museum. By good nursing this became 1,303*l.* Some other subscriptions raised the amount to 2,200*l.*, and now the building is finished and opened, the whole town on the occasion spending the afternoon *en fête*.

The building was erected under the superintendence of Mr. Russell Mackenzie, architect, Aberdeen. Mr. Robert Forsyth was clerk of works.

Internally, on the ground-floor, are the court-room, museum, and library, the retiring-room from court-room, and a committee-room. A stone staircase leads up to the first floor, where there is a large public hall, which measures 56 ft. 6 in. long, by 40 ft. broad and 30 ft. high. The roof is octagonal in form, and panelled in squares. The cost of the building amounts to about 2,500*l.*, and the contractors were,—for the mason work, Mr. Manson, Thurso; for the carpenter work, Messrs. Garvie & Sons, Aberdeen; for the plumber work, Mr. Johnston, Wick; for the plaster work, Mr. Smith, Thurso; for the slate work, Mr. Ross, Thurso; for the painter and glazier works, Messrs. J. & S. Fyfe, Aberdeen. The ironwork was supplied by Messrs. G. Smith & Co., of the Sun Foundry, Glasgow.

The elevation of this building, Gothic in style, is divided into five bays, by buttresses, which terminate above the parapet in carved pinnacles and finials, while the two centre ones rise to a greater height, and are enriched at the angles with carved crockets. Each compartment is finished with a pointed gable, pierced by a quatrefoil window. In the centre compartment is the entrance doorway, with pediment abutting on the buttresses, which project sufficiently to receive it; and over the pediment is a parapet, with sunk Gothic panelling. Over this doorway is the centre window of the public hall, and above it is a moulded Gothic window, filled with stained glass, representing St. Peter in the usual attitude, which is the arms of the town. In each of the other compartments is a plain two-light ground-floor window, with moulded string-course over; a two-light first-floor window, with label moulding, resting on curved blocks, stone mullion and astragal, and sunk and panelled breast for coats of arms, two of which are already carved, and are the arms of the Ulbster family and of Mr. Henderson, of Thurso. Over the first-floor windows is a cornice, with enriched blocks, representing fruit, flowers, and leaves, each block being of a different design. Above the cornice pointed gables terminate the various compartments.

We must express a hope that a rough engraving of the front in the *Northern Ensign* does not do justice to the design.

PROFESSOR TYNDALL ON THE WATER SUPPLY OF LONDON.

AT the Royal Institution, on Friday evening, Professor Tyndall delivered a lecture upon the "Scattering of Light," which was, in point of fact, a discourse upon domestic water supply. Having established that the visibility of the track of a beam through water depended upon particles by which the light was reflected, the Professor next placed before the electric lamp a succession of nine bottles, containing samples of the water supplied to their customers by the various London water companies. The turbidity revealed was in every case sufficient to make the audience regard water as a very undesirable beverage. That of the Lambeth Company displayed pre-eminence of a bad kind; that of the Kent Company was by far the clearest; the West Middlesex Company stood second in order of merit; and among the rest there was little to choose. With a reticence more eloquent than words, the lecturer avoided expressing opinions about the dirt that he exhibited; and he also expressly mentioned that pellucidity was no proof of the absence of soluble impurities. He also showed, that to cleanse water from suspended dirt was a very difficult matter, and exhibited four specimens of distilled water, a specimen once filtered by Mr. Lipscombe, a specimen that had gone through a silicated carbon filter, and a specimen four times filtered through bibulous paper in the Royal Institution laboratory. These were clear when compared with the waters of the companies; but the track of the beam was plainly visible in all. A specimen of water from the Lake of Geneva was then exhibited in illustration of great natural purity, and here a faint blue line only could be seen. This brought Professor Tyndall to the practical conclusion at which he had been aiming,—namely, to an account of the water supply yielded by the English chalk formations. He characterised this as being of the greatest attainable purity, inexhaustible in quality, and easily accessible for the supply of the metropolis. He described its natural hardness as being such as to render it unfit for domestic use, but explained that by Clark's (lime) process this hardness could be entirely removed at the central works, and that the water might be delivered in London at a uniform temperature, free from organic impurity or suspended particles, and so soft as to be perfectly adapted for all household purposes. He described Clark's process, and illustrated it before the audience, and finally showed actual results by producing a bottle of water from Canterbury, derived from the chalk, and softened in the manner described. By the side of this was a similar bottle containing the water supplied to the institution, and the two were illuminated together by way of contrast. The difference was like that between peasoup and crystal. Professor Tyndall then read a portion of the report made some years ago by the late Professors Graham and Miller, and by Professor Hofmann, upon the admirable qualities of this chalk water when artificially softened, upon its fitness for the supply of the metropolis, and upon the impolicy of allowing it to pass into private hands; and he concluded by saying that every word that he had read he desired fully and cordially to endorse.

As is usual when Professor Tyndall lectures, the theatre and gallery were densely crowded, and many distinguished personages (amongst others the Chancellor of the Exchequer) were among the audience.

FALL OF BUILDINGS.

Fall of Houses in Thames-street.—On Thursday in last week, at eight o'clock, p.m., an alarming accident took place in Upper Thames-street. It appears that for some time past men have been employed in pulling down some old houses at the rear of the buildings in Garlick-hill, and also behind those in Upper Thames-street, and the consequence was that the Bridge Coffee-house and other buildings were deprived of a portion of their support. At the time mentioned, the coffee-house and a house next to it came down with a run, after some premonitory symptoms which were sufficiently early to enable most of the inmates to escape. A woman was endeavouring to escape with her baby (having already helped her husband to remove her other children), when she was partly buried in the falling *débris*. A boy who was passing at the moment, was completely buried. The Fire Brigade and the London Salvage Corps at once hastened to the spot, and extricated the two children. One was cut over the forehead. The woman was also seriously injured. Both were removed to St. Bartholomew's Hospital. Several other injuries of a slighter character were sustained by children and adults. Reference has been made at a meeting of the City Commission of Sewers to the fall of these two houses. It was stated that they were built in the year following the Great Fire of London in 1666, and that the timber had become "as rotten as touchwood."

Fall of a Warehouse in Farringdon-street.—At the side of the Brigade Fire-engine Station, in Farringdon-street, runs a narrow thoroughfare called Bear-alley, and at the end of this place has lately been erected a brick and timber building, nearly 200 ft. long, three floors high, and of considerable depth. The warehouse was in the occupation of printers' brokers, &c. On Friday night, at eight o'clock, a terrific noise was heard, and on the firemen rushing up the alley it was found that about one-third of the warehouse had fallen into the court, bringing with it the massive window-frames, &c., and burying a quantity of the stock-in-trade. So far as could be ascertained no one was injured.

Fall of a Churchyard Wall at Brighton.—A large portion of the west wall of the Old Churchyard, almost opposite to Upper North-street, has fallen very suddenly, and without the slightest indication that any portion of it was insecure. No other damage was done.

HOLLOW BRICK WALLS.

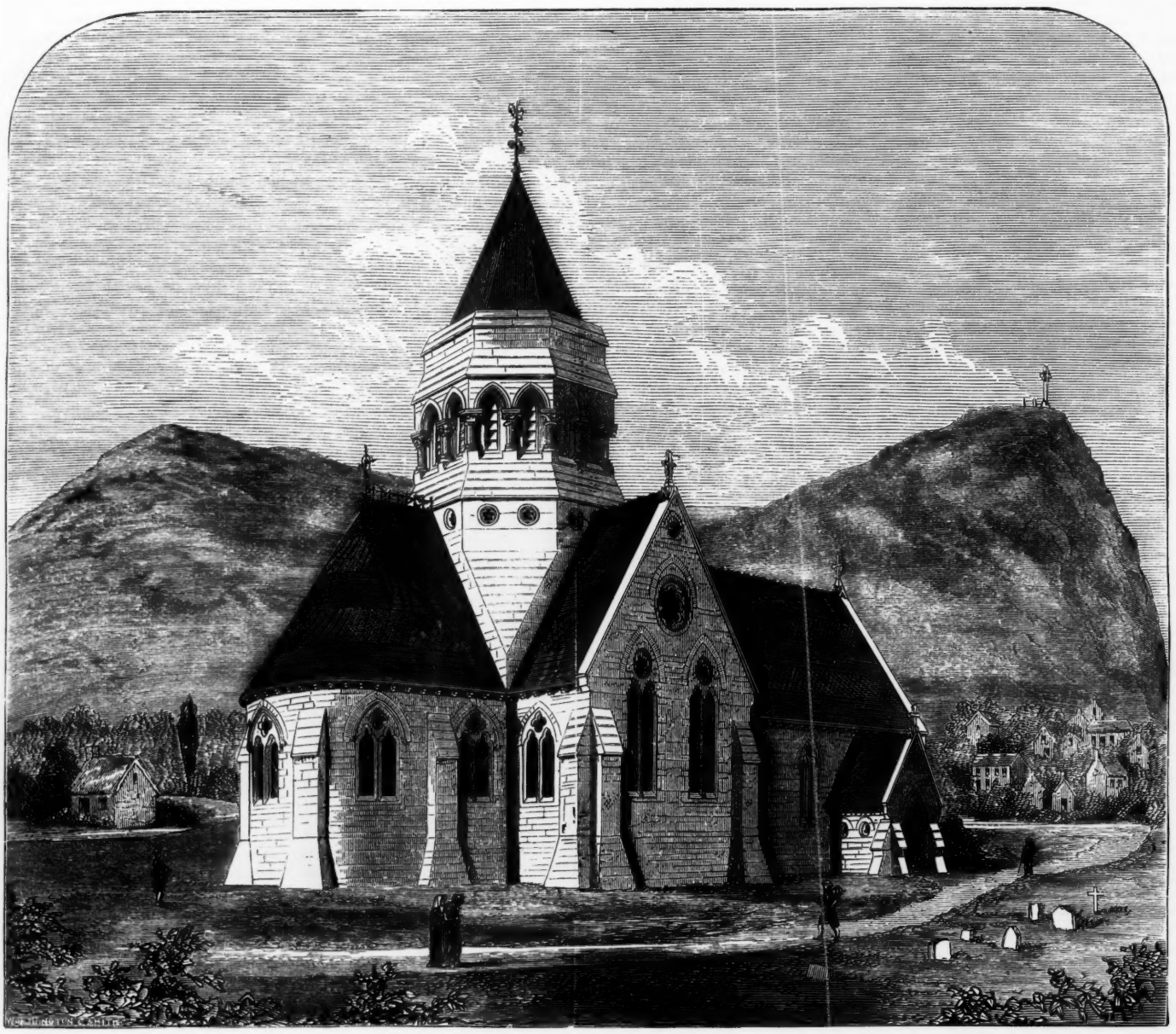
SIR,—Your correspondent, Alfred R. Wallace, may observe a block of two houses, called "The Close," at the south end of Park-lane, Croydon, which are said to be substantially built and free from damp, the walls of which are only 14 in. thick, and hollow.

The bond is two stretchers and a header, and the headers from inner and outer wall lap and coincide for three or four courses, when the bond is broken, that no line of headers may divide the hollow space into separate chambers.

All corners and angles of recesses are solid.

The houses are four stories in height.

CHARLES E. AUSTIN.



THE CHURCH OF ST. SENANUS, FOYNES, LIMERICK.—MR. J. J. MCCARTHY, R.H.A., ARCHITECT.

THE CHURCH OF ST. SENANUS, FOYNES, IRELAND.

THE Church of St. Senanus, of which we give a view, is situated close to the railway station, on the south bank of the river Shannon, at Foynes, county Limerick. It serves as a supplemental church for the parish of Shanagolden, and also accommodates the sailors of the ship-of-war stationed at Foynes. Its erection is mainly due to the liberality and zeal of Mr. Stephen E. de Vere, the present high-sheriff of the county Limerick. The nave, south aisle, and north porch are already built, and are provisionally used for divine service till the entire design can be completed. The church is from the design of Mr. J. J. M'Carthy, R.H.A., architect. Messrs. Ryan & Son, of Limerick, are the contractors. The walls are built of local limestone, of a dark colour, with dressings of white limestone, from the quarries near the city of Limerick. The shafts of the pillars, between the nave and aisle, are of red Cork marble, with Portland stone moulded bases, carved capitals, and moulded arches. The roofs are of open timber-work, stained and varnished, and are covered with Killaloe and Bangor slates, in alternate bands.

The cross shown on the distant cliff is the memorial of the late Hon. Stephen Spring Rice, erected by the tenants of the Mount Trenchard and Foynes estates.

THE FRERE FOUNTAIN, BOMBAY.

THIS important work, which is the largest of its kind in India, has lately been erected by the municipality of Bombay as a testimonial of the esteem in which their late Governor, Sir Bartle Frere, is regarded by that presidency. The idea was originated by a native gentleman, Mr. Cursetjee Furdanjee, who gave a liberal donation towards its erection. The height of the fountain, measured from the water-line, is about 35 ft., and it stands in a large basin, 100 ft. in diameter, surrounded by an ornamental iron railing, having lamps at intervals. The material is Portland stone, excepting the columns at the base, which are red and grey granites. The four sitting figures are considerably over life-size, and are representations of four of the leading products of India, while that on the top is a representation of Flora. In addition to these there is also a series of four dolphins, from which are discharged fan-like jets of water into shells; the waste water then escapes through the serrations of the shells into basins below, and is further utilised for the supply of jets lower down. In addition to the figures and ornamental sculpture, the fountain is further enriched by bronze heads of lions and panthers. From these heads are discharged jets of water, which fall into the large outer basin. All these jets, however, are subordinate to that in the centre; this wells up like a natural spring, the sound of which must be refreshing in a hot climate like that of Bombay. The execution of this fountain, which has cost about 4,000*l.* exclusive of foundations, large outer basin, waterworks, ornamental railing, lamps, freight, and fixing, was intrusted to Mr. Forsyth, of London, who was already known for his works in this department of art, and who, with the friendly co-operation of Mr. R. Norman Shaw, architect, has carried it out in a successful manner. The site chosen for its erection is the Esplanade, the most salient and central position of the European quarter of the city.

THE FRERE FOUNTAIN, BOMBAY, INDIA.——MR. FORSYTH, SCULPTOR.

HOMES IN THE EAST OF LONDON.

A FRESH VISIT TO BETHNAL-GREEN.

PURSUING our investigations, we select a well-known district, comprising a portion of two other parishes, and often reported on in our pages. As we glance upon the map, we find that the walk we had allotted to ourselves is too large to be taken during the time at our disposal. Reducing the outline, we adopt as our base of operations the broad thoroughfare of Shoreditch extending from the Great Eastern Railway to the foot of Hackney-road, facing eastward thence between the lines of the latter road and the line of railway stretching until both intersect Cambridge-road. Entering Boundary-street at the back of Shoreditch Church, we pass along with some delays until it opens into Bethnal-green-road. We traversed several alleys and courts, dirty and dismal, the denizens of which told their own tales in their pallid faces and tattered raiment. Here and about, the pavement of the streets, the flagging of the paths, the condition of the side channels, and the general state of the entries and back-yards are unendurably bad. Let us instance New and Old Nichols streets, the latter particularly is miserable and melancholy to behold. A showery day gives a vividness to the repulsive features observable. Rags, millboard, an old hat, or newspaper, will be found in this quarter doing duty for a pane of glass. We noticed several sashes here altogether free of panes, but we had no doubt about the aches within. There are many houses in this quarter not in habitable condition, and the back-yards of several are full to overflowing with nastiness and filth. The lanes off Mount-street, formerly Rose-street, as an old sculptured tablet dating from 1725 informs us, are also in a filthy condition, and the channels are unable to discharge themselves, or the sinks to carry off the liquid matter, household slops, or rainpour. At the end of this street, where it leads into Old Castle-street, and abuts against a blind street, the terrible conflagration which we noticed in the *Builder* last autumn occurred. It would appear that neither fire-warnings nor fore-warnings make much impression upon some people; and though they escape with difficulty once or twice, they are still ready for some petty advantage to risk their lives again. The houses that were here completely gutted of floors, windows, and roofs, are now being repaired, and are already occupied; and the large timber-yard, whose close proximity caused all this dreadful havoc, will be soon restocked.

The authorities of Shoreditch or Bethnal-green ought to see that the back wall of the timber-yard is built of sufficient height and thickness to prevent such another accident as the last. There will exist the same danger as before, and perhaps the next time there will be a greater loss of life, if timely precaution be not taken. To give the people at the back of this timber-yard a chance for their lives, a passage should be opened into Newcastle-street, and the street allowed to exist no longer as a blind street. A brick wall alone cuts off egress.

A few yards hence and we are in sight of Columbia Market,—a failure as a meat-market, and only a partial success as a fish-market. What a pity that such a large foundation, begun under such good auspices, and having its inception in such a fine benevolence, has not borne better fruits. Miss Burdett Coutts has, at all events, done her duty nobly; but the public and the poor, who form the largest part thereof, are not easily convinced. Fashion sways them, and prejudice leads them, and sharpers traffic on their credulity.

Opposite Columbia Market, on the Crabtree-road, there are streets, lanes, waste spots, and back-yards in a most wretched condition, dilapidated houses, whose shattered doors and windows bear all the appearance of having been once bombarded, and are now tumbling to unmistakable ruin. Passing through an old gateway here, where we had to pick our steps through 6 in. of heavy sludge, we found ourselves in a few moments among a number of old tenements, that no stranger could expect to find in such a place. We wind round an angle, and we find ourselves face to face with more old buildings, with patches of little gardens in front, but quite trodden upon and denuded at this season. Here we find poverty, dirt, and rags. No scraper or besom of Bethnal-green scavenger sweeps in here, nor are the denizens alive to the danger that surrounds them. Their homes are gloomy and bare, and the gravest concern of their lives is how they will be able to "make both ends meet," by Saturday night. We move along, through a narrow passage, that cuts obliquely through the angle of a house, and while thinking what a villainous spot this would be on a dark night, find we are safely emerging into Virginia-row.

Turville and Tyssen streets are traversed, and the courts and lanes leading therefrom, but the picture is still unrelieved. While here and there we find these back and side streets barely passable and unswept, the narrow alleys and entries, and back-yards, are in a most filthy condition. Club-row, off Bethnal-green-road, has breadth of pavement and footway, but ruin is in full swing in this short street. Here domiciles of five stories may be found propped, and no doubt prayed for, that they may not fall and kill any one. The state of Sclater-street and the lanes and alleys branching therefrom is very bad. At the upper end of this, on a corner-house, a tablet has the following inscription, — "This is Sclater-street, 17—18." We need not stop to inquire who was Sclater. All we need say now is, posterity knows Sclater-street, and is shocked at its filthy condition, and that of its courts. Bacon-street has another stone tablet, with the date 1723.

Not long ago a new metropolitan police station was opened. In a crowd outside Bethnal-green Police Court, youth and old age, draggle-tail and drunkard, shameless Amazon and skulking vagabond, will be found congregated. Such a sight we encountered as would beggar all description. Talk of the Whitechapel type of humanity and roughness, Bethnal-green has no necessity to play second fiddle, so far as the elements that compose her street rabble may be analysed. This street exhibition of infamy of all kinds acts as a dangerous example to villainy in the bud. It is a living picture, on which the young mind gloats and hungers to see repeated. The neglected children in our streets thus grow up to manhood reflecting all, and more than all, of what they hear and see, and which, unfortunately, they are not slow to imitate.

Crossing Brick-lane—sacred to costers' barrows and street stalls—we wind along John-street by the Goods Station of the Great Eastern Railway, and thence, turning an angle, we reach Winchester-street. The house property about this quarter is in ruinous condition. The dwellings of the poor are low and mean, and the general character of the buildings as structures are of the "Jerry" type. If the rent can be screwed out of the tenants around here, the landlord ought to be thankful. These wretched tenements have been doctored to death, and they are now bursting asunder in sheer rottenness. Southampton-street and London-street have roadways and footways of the very worst type, and on the day of our visit they were almost impassable swamps. The footways were nearly as bad as the streets. The drainage here is no doubt very bad, and in rainy weather inundation in the street is the consequence; but here as elsewhere in the district, as we will show, no attempt is made at keeping the thoroughfare in repair. In this quarter, the Great Eastern Railway Extension will curve off, and sweep round by the top of Hackney-road. At the head of Three Colts-lane, dilapidations are in full swing in the line of railway, and the tenements here and about are miserable structures. Poverty and sickness are rife, and foulness and filth abundant.

The streets on each side of Old Bethnal-green-road we found in an abominably dirty condition. Minerva-street,—sludge, heaps of filth and ashes unremoved; Hope-street, Treadery-street, Temple-street, Charles-street,—all miserable, and here wretched attempts at repairs had been a-making, with an odd barrow of stones flung into the ruts. We went through some long passages or lanes leading off Old Bethnal-green-road, where rows of houses with little gardens before them may be seen. The roadway was deep with sludge, and the gardens in some instances but receptacles for all sorts of refuse. Perhaps the summer aspect might be different. The lanes parallel to this, and at right angles, are filthy, and heaps of unremoved dirt are in abundance.

Off Bethnal-green-road proper we found many streets and lanes in a similarly neglected condition. In the back and low places are choked drains, inundation, and heaps of unremoved refuse. In White-street and its offsets, and Derbyshire-street, there was no end of sludge, and not a scavenger or sweeper to be seen anywhere. Round about this quarter a great many poor are located, eking out a subsistence in making articles of household use for children, costermongers, wood-splitters, chair-carvers, pill-box makers, and several other shop and house articles for sundry uses, the profits from which enable them to keep body and soul together. Granby-street, Gosset-street, Thorold-square, Nelson-street, Essex-street, Gibraltar-walk, and the lanes, courts, and streets leading off these places, we found in an unclean and filthy condition. In all our walks about Bethnal-green, we did not meet more than half a dozen scavengers at work. Gibraltar-walk dips down into a hollow from Bethnal-green-road, and here and there are brokers, furniture-dealers, bird-fanciers, and cage-makers. If their health is good, they must have iron constitutions. The Bethnal-green vestry ought to take a walk round this quarter, and see whether its condition will have any effect on stirring them into action; but these last-named places are beauty itself compared with other unmentionable localities, where the "social evil" and the small-pox are killing bodies and damning souls together.

The epidemic is raging and increasing in virulence in many of the districts we passed through, hinging on one side to Hackney and on the other to Shoreditch, and we had great difficulty in obtaining information, from the reluctance of parties to allow any of their family to be sent to the hospital. In certain quarters we found the poor people entered into "a solemn league and covenant" to render no information to visiting officers, if they suspected them as such. They choose to nurse the small-pox at home, and in many instances they doggedly refuse to let their children be vaccinated. It is curious to hear their reasons and the foolish notions they entertain. In some instances, they have a show of reason upon their side; for we find that some few medical men have not taken particular care with the cases they have attended. The health and general constitution of the patient operated upon ought to be known. Fresh and healthy matter is a necessity, that the eruption may be perfect. If the poor are not properly vaccinated the rich will assuredly, through one channel or another, eventually suffer.

From the corner of Gibraltar-walk to Shoreditch the Bethnal-green-road requires to be widened several feet. The increasing traffic of this thoroughfare,—the ready and direct access to the new East London Museum, in course of completion,—necessitates it. The drainage of a large portion of the Bethnal-green district is very defective, and the back lanes and court-yard fountains exist in many places as a nuisance surrounded by nuisances. Many of them are most dismal spouts.

Old weather-boarded houses on the front, and half-timbered ones, are numerous in the district, and they are sources of danger in case of fire. The many small furniture workshops and timber-yards on all sides of Bethnal-green and Shoreditch are another element of danger, and ought to lead to the perfectness of an efficient and ever-ready fire-brigade for the district.

To sum up the general condition of the portion of Bethnal-green district we passed over would be to simply say, Bethnal-green is in a most disgraceful and neglectful condition, and has been so for years. Some of the predisposing causes of this state we have already shown, others are to be found in the long-protracted squabbles of its local boards. This charge also applies equally strongly to Shoreditch, and in a minor degree to Hackney. Some of the local organs are also to blame for fanning up and keeping alive factious quarrels between opposing parties. Instead of catering for the wants of the poor of the parish, and directing the whole of their energies to counteract the spread of a serious epidemic, we have the members of three local boards leaping at each others' throats, and acting more like savages than Christians. Need we wonder that fever stalks abroad, that people sicken and die, amidst streets and lanes full of filth; that prostitution and destitution, abomination and desolation, curse the earth. How can it be otherwise? Have we not seen honest men who have raised their voices and taken up their pen to strive against this fearful torrent of vice and filth denounced, held up to the fool's scorn, and the knave's laughter. Death, however, strikes indiscriminately, and the arm that is often stretched in relief, and the hand that is raised to strike down, are palsied together.

In dealing with the localities we have passed under review, we have been compelled to leave out minute details, and numerous sad recitals of

suffering and want which we encountered. From what we have seen, heard, and carefully examined we are justified in pronouncing judgment as we have done.

THE SEWAGE QUESTION.

Sewage Irrigation at Kidderminster.—On the recommendation of the Home Office, the town council resolved to purchase 130 acres of land from the Earl of Dudley, for the sewage irrigation, and steps were taken to ascertain at what price the land could be got. Mr. J. Mathews, of Edgbaston, the earl's agent and valuer, has asked from the council 150*l.* an acre (including compensation), and this, added to the cost of way-leaves to the land and construction of the sewer, would make the total expense of the Wilden scheme at least 25,000*l.*, instead of the 19,000*l.* or 20,000*l.* at first estimated. The council have therefore instructed Mr. Fairbank, their engineer, to look out for other land, and he now recommends a tract of 100 acres, which may be obtained at 80*l.* an acre. This lot is situated about the same distance from the town as the Wilden Estate; but it will involve the erection of covered tanks somewhere near the Caldwell Mill, from whence the sewage would flow by gravitation through a sewer under the river and canal to a site near the Round-hill, where pumps would force it through a rising main pipe into a tank at such a height that it would fall by gravitation through the outfall sewer to be laid along the Stourport-road to the proposed irrigation works. The scheme involves no compensation to tenants, no way-leaves, as the sewer would be constructed on the high road. This scheme would cost 14,700*l.* as compared with 25,500*l.*, and while the charge on the borough in the Wilden scheme would be 1,659*l.* a year, that on the Stourport-road scheme would be 956*l.*

WASTE AND WANT OF WARMTH.

SIR,—There seems no good reason why the present chance arrangement of our cherished open fire-places should exist, whilst health, pleasure, and economy are at stake. The boasted constructive and scientific skill of the period leaves the domestic hearths, around which our social system revolves, a troublesome, uncertain, smoky, and expensive source of enjoyment but one step in advance of the hearths in the humblest Highland home, where

> "The red peat gleams a fiery kernal,
> Enhuskèd by a cloud infernal."

Defoe wrote, 180 years ago—"We are the most lazy, diligent people in Europe, and the most prone to gratify the senses." Burns has pictured to us "the cozy ingle blinking bonniely," yet we are far from having comfortable fire-places in every dwelling, where warm pure air is of such great benefit during the cold, damp weather of this country.

A writer in the *Family Economist*, as far back as 1848, says—"I have known ingenious mechanics contrive in a simple manner to increase the warmth and pure air required in their houses by having an air-duct of iron or clay pipes long enough to reach from the outside of the house to the fireplace. This fresh-air duct is laid under the floor, and the inner end is brought into a hollow space or chamber made at the back of the fire. The chamber becomes hot, and consequently air rushes into it from the outside, and, after being heated, passes by another tube into the room at one side of the mantel-piece. Thus without any additional fire, a greater amount of warmth is obtained. To make this plan answer, the arrangements must be very carefully contrived." But several such improved fire-grates may now be got, as noticed in the *Builder* of 10th December last.

Tomlinson, in his "Treatise on Warming and Ventilation," describes the ancient Roman hypocaust, and says,—"The hypocaustrum is well known to the Chinese, and is in common use about Pekin, where the winter weather is very severe. The houses of the better class are built with double walls, and with hollow flues extending beneath the floors; even the benches and sleeping-places are warmed in such a way that it is scarcely possible to improve upon these refinements of the Chinese."

We may, however, advantageously to health and comfort, make them applicable to our buildings, which are all, more or less, constructed with (what we may call) double walls, as the stone or brick outside wall has generally an inside lining or wall) of laths and plaster, with a hollow space of 1 in. or more between them, where heated air from hot-water pipes may usefully and easily be employed to heat this space, and so warm the thin interior wall, the cold, greedy plaster of which now absorbs the vital heat of our bodies, whilst a temperature of 60 degrees can only be obtained by over-heating the fresh air we require for wholesome breathing.

Much of the heat now wasted up the chimney of open fireplaces might be retained in chambers at back and sides of grates, and used to warm hollow walls, or at least to give suction to ventilating-flues for expelling vitiated air.

The introduction of fireproof plaster walls is alluded to more than twenty years ago,—in the *Builder* for 1849. "Fireproof ceilings of wire-work have been successfully applied in place of laths, with plaster or stucco as usual, at the Chester Lunatic Asylum. The wires are about ¼ in. apart, and the plaster forms an adhesive and serviceable mass even on both sides. The wire is galvanised or japanned, to prevent corrosion. Not only ceilings, one would think, but thin partitions and walls in general, might be wired in place of lathed, and risk of fire greatly diminished, by a process neither patented nor costly;" and we could then have the heated air applied in space behind, and so warm the walls of rooms with safety and economy; and in buildings as now constructed, we may warm the floors and walls around the rooms by hot-water pipes placed in the void spaces below the floor and behind the laths and plaster of the walls, and so promote a healthy and economical system of heating and ventilating both public and private buildings, and tend also to equalise the temperature of the different apartments, preventing disagreeable currents of air, and dangerous chink-draughts. J. K.

PROGRESS OF GLOUCESTER.

SIR,—In your excellent article "A Note in Gloucester," in your issue of 21st inst., you observe, the commerce of Gloucester being mainly in grain, has led to the formation of a commodious dock surrounded by warehouses, for the lading and unlading of ships, &c. This is quite correct; but had you turned your attention to the bridge dividing the docks from the main line of ship canal, you would have seen another branch of commerce well deserving attention. Commencing at this bridge (Llanthony), for more than a mile on the east side of the canal is a continuous line of timber-yards of foreign import, with the Midland Railway line running through each; and intermingled with these are very extensive saw-mills, and manufactories of joinery of all descriptions; also the extensive works of the Glo'ster Wagon Co., employing nearly 1,000 hands; extensive oil-mills, &c.; indicating a degree of progress, probably more marked than at any port in the Bristol Channel. N.

OLD HOUSES NEAR BIRMINGHAM.

AT the last meeting of the Archæological Section of the Birmingham and Midland Institute, Mr. A. E. Everitt read a paper on "Old Houses in the Neighbourhood." He began with Maxstoke Castle, which, he said, was rather a fortified manor-house, and, in many respects, a most perfect relic of the middle of the fourteenth century. Astley Castle was next described, and the once fine Collegiate Church of Astley. The stone moated house, New Hall, near Sutton Coldfield; Baddesley Clinton, Coughton Court, the Hall of the Knights Templars, at Temple Balsall; the Oak house, in the parish of West Bromwich; Berry Hall, near Solihull; Grimshaw Hall, near Knowle; the Old House, at Barnet Green; the Old Free School, at King's Norton; Parkwood, Pooley; the Moated Hall, at Perry; Hillfield Hall, near Solihull; the Old Manor House, at Grafton, near Bromsgrove; Sheldon Hall, Castle Bromwich Hall, and Aston Hall were included in the paper. The whole series was illustrated by a large collection of drawings, taken by Mr. Everitt.

Dr. Langford remarked that, during the reading of the paper it had occurred to him that, in addition to the admirable descriptions and illustrations of the "old houses in the neighbourhood," they had a history of their own, which every member of the section might assist in hunting up. Each of these houses had its particular history, and the section would remember when on an excursion to Maxstoke Castle, Mr. F. Dilke read a curious paper to them respecting the history of that place. It would be exceedingly interesting to have collected together an account of the history of the old houses, and he thought it might be done very judiciously. If the members could also obtain access to the deeds relating to the old houses in the neighbourhood, they might obtain nearly their whole history. By this means some very valuable information could be procured.

EDUCATION FOR THE WORKMAN.

SIR,—Your correspondent of the 14th inst., in a letter headed "How do you prove your Plumb-rule?" referred to the want of technical education amongst mechanics.

I have myself been often greatly surprised at the ignorance of mechanics in this respect, and have met with many men, both in town and country shops, who could not set out or describe some of the simplest geometrical figures, such as an equilateral triangle, a hexagon, an octagon, &c. I have also met with men acting as foremen who could not set out the above figures when the length of one side only was given, or could not raise a perpendicular on the end of a given line without the aid of the square.

How many men calling themselves bricklayers can set out a gauged arch or find the centre for striking a segment arch (when the opening and rise only are given), except by the rule of thumb or guess-work?

I should like to see technical education more general among the working classes, as I think, with your correspondent "C.," that it would raise them socially and morally.

FRANK CHESSELL.

A NEW ARTIFICIAL STONE.

A PATENT has been taken out by Mr. Frederick Ransome for a new material, composed of finely divided silica in a soluble state, a solution of silicate of soda or potash, or a mixture of the two, with lime-burnt chalk or other material. When mixed, caustic soda or potash is set free by the action of the lime and combined with the finely-divided silica. The lime may be either quick lime, or partially hydrated, or in other forms, such as Portland cement. The result is to produce an artificial stone of great specific gravity, capable of taking a fine polish; and, when other substances are introduced, as can easily be done, a kind of Scagliola is obtained, which, it is claimed, has the advantage of resisting the weather.

The specimen we saw was a large step, in imitation of red Peterhead granite, the colour being obtained by a metallic oxide, and the appearance of felspar by the intermixture of small broken crystals of natural carbonate of lime. Greys and other colours can be similarly produced.

The specification further includes some new combinations of the silicates to be used for lining vessels in use for acids and acid vapours, and also for the reception and transmission of heated air and gases.

DANGEROUS ROADS IN PADDINGTON.

SIR,—I know of no publication so suitable as the *Builder* to give publicity to the state of affairs adjoining the Great Western Hotel and the Metropolitan Railway; nor do I know of anything so likely to procure redress of a dangerous public grievance,—I might say a nuisance,—as some remarks from the editor of the *Builder* on the subject. The darkness and danger, and the perilous passages there existing, lead me to put the following questions:—

Can the railway company and the proprietors of the hotel be compelled to light their lamps? If not,—

Is the parish bound to supply others?

Several applications have been made to the police in vain. ÆDILIS.

THE PREVENTION OF KITCHEN BOILER EXPLOSIONS.

SIR,—Having contrived what I consider an effectual guard against kitchen-boiler explosions, I will, for the public benefit, and with your permission, describe it.

At the top of the boiler is inserted an iron pipe, which is then carried down outside, and below the top of the boiler 2 ft.; then bent, and carried up about 3 ft. This pipe will represent

an inverted syphon. It must be charged with mercury, to stand in each leg to the depth of about 16 in. The apparatus is now complete, and at all times and under all circumstances ready for action, which would be thus:—Say the boiler is full of water, and the water-pipes in connexion with it sealed up by frost or any other cause; a fire is lighted, the water expands, or steam forms; either of which taking place, pushes the mercury out of the iron pipe, leaving a free passage for escape. The length of the turned-up end of the pipe here named will suit where the cistern is 30 ft. above the boiler; other heights will require a proportionate turn up of the iron pipe.

To prevent explosions caused by want of water I would have a common lead plug inserted in any part of the boiler exposed to the immediate action of the fire. This, when the boiler is empty, would melt, and leave a hole for the escape of steam formed by the passage of water into the hot boiler. This is an old application to steam boilers. THOMAS HOLT.

HOUSE-BUILDING ON VERBAL AND WRITTEN CONTRACT.

AT the Ashby-de-la-Zouch County Court, on Thursday, January 12, before Mr. Serjeant Miller, Judge, the case of Widdowson & Adcock *v.* Thomas Cheatle was tried; claim, 38*l.* 0*s.* 11*d.* A set-off for 105*l.* was pleaded.

The plaintiffs are joiners and builders at Ashby, and entered into a contract to build a house for defendant for 100*l.* The sum now claimed was alleged to be the balance due. From the evidence it appears that the contract was only a verbal one at first, but after the work had proceeded for about a month, then a written agreement was given, which stated that plaintiffs engaged to build the house for the sum specified, and to find all materials for the completion of the work. A man named Orton was employed by plaintiffs to do the brickwork, and he being indebted to them to a large amount, a portion of the sum due to him was to go towards a liquidation of the debt. The plaintiffs gave defendant authority to pay money to Orton at various times, for which they gave receipts, but they now disputed a sum of 4*l.*, which they alleged defendant had paid without their authority. Plaintiffs also denied their liability to pay for 17,000 bricks, and also for tiles and laths which the defendant on the authority of plaintiffs had either ordered or obtained.

The Judge, on reviewing the evidence, said that it was clear to his own mind that the authority to pay Orton had not been withdrawn, and that the plaintiffs having signed a contract to find all the materials for the building of the house, they were clearly liable for the bricks and other materials used, and the verdict, he said, would be for defendant; but on an examination of the accounts it was found that 5*s.* 7*d.* had been allowed for discount when the account for tiles and laths had been paid, and this had not been deducted.

Mr. Wilson therefore submitted that his clients were entitled to a verdict for this sum.—Verdict for plaintiffs for 5*s.* 7*d.*, which just saved costs.

TENDERS FOR THE NEW LAW COURTS; FOUNDATIONS.

THE following is a list of the tenders delivered on the 20th instant, for putting in the foundations for the Law Courts, in the Strand, under Mr. Street, architect:—

Gammon & Sons	£68,347	0	0
Holmes & Nichol	66,900	0	0
Lucas, Brothers	65,719	0	0
Myers & Sons	57,435	0	0
Lee & Sons	56,500	0	0
Taylor, Johnson, & Smith	54,240	0	0
Markwick & Thurgood	49,000	0	0
Holland & Hannen	48,300	0	0
Kirk	48,182	0	0
Webster	47,500	0	0
Cubitt & Co.	46,555	0	0
Brass	46,240	0	0
Trollope & Sons	45,473	0	0
Perry	44,973	0	0
Browne & Robinson	44,680	0	0
Hill, Kiddell, & Waldram	42,750	0	0
Higgs	41,987	0	0
Henshaw (too late)	38,350	0	0
Axford & Whillier	37,175	0	0
Dove, Brothers	36,755	0	0

The difference between the highest tender, 68,347*l.*, and the lowest, 36,755*l.* (nearly 32,000*l.*), both being from known and established contractors, will increase the astonishment caused by statements in the same direction that we have recently made. The result would be interesting, if the two parties were to make an analysis and comparison of their several estimates.

IS A SCHOOL A NUISANCE?

THE case, Harrison *v.* Good, tried in the ice-r Chancellor's Court (before Vice-Chancellor Si James Bacon), involved this question:—

It was a suit to prevent the erection of national parochial schools on a plot of ground in Abbey-place, St. John's-wood, as being a nuisance within the meaning of a certain covenant. The plot in question is part of the Eyre estate, which was sold in building plots, in the year 1824, by Messrs. George Robins, and for the purpose of building suburban residences. The situation was then described in the particulars of sale as being very picturesque. Mr. John Thurlow was the purchaser of the lot in question, and, in accordance with the conditions of sale, entered into the following covenant:—

"That the said John Thurlow, his heirs, or assigns, shall not do or suffer to be done on any of the premises anything which shall or may be deemed a nuisance to Henry Samuel Eyre, or any of his tenants, or the occupiers or proprietors of the adjoining property, or the houses to be built thereon."

The plot of ground came into the possession of Mr. Good, architect, who offered it as a gift to the schools committee of the parish of St. Mark, of which committee he is a member, for the purpose of erecting schools thereon. This bill was filed by the owners of houses built on other parts of the Eyre estate, with the objects above stated, the defendants being the school committee.

The Vice-Chancellor said, it was clear that the plaintiffs were persons entitled to the benefit of the covenant; but he could not extend the word "nuisance" beyond its strict legal meaning. He had no doubt the erection of the schools would cause annoyance to the plaintiffs, and depreciation of their property, but that formed no ground for the interference of the Court. Looking, however, to the facts disclosed by the evidence, that there was a proper site on which the schools might be built near the church, without annoying anybody, and that Mr. Dangerfield, one of the plaintiffs, had offered to buy the site he objected to at the price given by Mr. Good, he thought the conduct of the defendants such that they ought not to be allowed their costs.

We understand an endeavour will be made to reverse this decision as to costs on the ground of misstatements made by the plaintiff's counsel, and not contradicted from want of proper instructions by counsel on the other side.

A correspondent wishes it understood that the school in Marlborough-place was not given up on account of the "frequent complaints" made against it, which was not the case, but solely and entirely in consequence of the very dilapidated and filthy condition of the buildings, and the insufficient and unsuitable arrangements for carrying on the school. Mr. Dangerfield never offered to give *any site* for the intended school-building; nor did he procure the means even of getting access to the church ground, alluded to in the report, from the Mews by Violet-hill. Mr. Good was appointed the architect to the new intended schools in the year 1866, and in the beginning of 1867 had prepared the drawings, ready for contract. A meeting of the vestry was held, when it was determined to build on the church ground forthwith; but at the eleventh hour it was discovered that, without the consent of the trustees of the church site, they could not build. That consent was withheld then, and the building on the church site was abandoned. The consent now cannot be obtained for the same reasons as prevailed in 1867,—namely, that the trustees are nominees of Mr. Harrison, the plaintiff, who holds house property in the neighbourhood of the church, and the consent to build the schools on the church ground is withheld because they were and are supposed by Mr. Harrison to be a "nuisance." The district parish of St. Mark is very small, and does not exceed three-quarters of a mile in length by a quarter of a mile in breadth, and, with the exception of Lord's Cricket-ground and the piece of freehold land which Mr. Good purchased, there is no plot whatever for any building. The consequence is, that in the event of the obstacles still remaining to build on the church ground, there is no spot whatever where the schools could be built within the district except on the site which the architect proposed presenting to the parish,—a site that cost him between 1,100*l.* and 1,200*l.* It is true that Mr. Dangerfield offered to give what had been paid for the land in question, but the offer was only made after the costs had been incurred. Of course, after having made the promise to present this site, Mr. Good could not do otherwise than decline to enter into any negotiation to sell it.

A CONTRAST: KAISER AND KING.

To wear the crown—to rule o'er noble men,—
To set th' Imperial circlet on the brow—
To win War's laurels in the wide world's ken,
Can human Pride more lofty moment know?

Yet is the laurel dyed with grewsome stain,
The pearly crown with misty tears is dim,
The lives of men a circlet dearly gain,
And leave upon the brow Death's shadows grim.

Ah! softly still shall rest the diadem
Which Rome bestows upon her chosen one,
And pure the lustre of its latest gem!
That gem—a nation's full heart nobly won,
When by kind word, and gift, and ready speed,
Kings aid the homeless—for the orphan plead.

M. Y. F.

QUANTITIES.

SIR,—A memorandum lately published by the Royal Institute of British Architects contains the following paragraph:—

"In cases where the quantities are provided, it is recommended that, unless a surveyor be mutually agreed upon by the architect and builder, two surveyors be employed to take off the quantities, one appointed by the architect and the other by the builder, at a meeting convened for the purpose."

The plan here recommended, however well it may work in most cases, appears to be sometimes open to the following objections:—

First. It frequently happens that clients, *before inviting builders to tender*, require their architect to inform them of what, within a small amount, will be the cost of the work to be carried out. This, plainly, cannot be properly done, unless the architect is furnished with quantities, a mode of proceeding which requires the aid of a surveyor not "mutually agreed upon."

Second. It admits of no change being made either in the names or number of the builders who are invited to tender.

Third. When it is necessary to begin the work at short notice, that time would be lost which would be occupied in the meeting and making of the arrangement recommended in the memorandum.

On this last account, I have lately had the quantities for a building, about to be erected in London, taken out by a surveyor appointed by myself alone; and, consequently, two builders amongst those asked to tender, acting on the memorandum, have declined to do so.

I have ventured to call your attention to this matter, thinking it one of interest both to architects and builders.

W.

THE INSTITUTION OF CIVIL ENGINEERS.

ON January 10th, Mr. Joseph Cubitt, V.P., in the chair, the paper read was "An Account of Floating Docks, more especially those at Cartagena and at Ferrol," by Mr. George Banks Rennie.

After touching upon the various modes formerly adopted of cleaning and repairing the bottoms of ships, the author referred more particularly to the wooden floating docks introduced by Mr. Gilbert in the United States of America, and to that made by him, in 1858, at Venice, for the Austrian naval arsenal of Pola, in which the two largest ships that had been docked were the *Kaiser*, of 3,225 tons, and the *Ferdinand Max*, iron-clad, of 3,066 tons. The Messrs. Rennie having been called upon by the Spanish Government to make a proposition for furnishing a floating dock for Cartagena, capable of raising the class of iron-clad ships then about to be added to the Spanish navy, having a weight of from 5,000 tons to 6,000 tons, which represented the *Numancia* and the *Vittoria* types, they proposed a dock somewhat similar to that constructed at Venice, but of iron instead of wood, with certain important modifications. In the wooden structure, in order to sink the dock sufficiently, it was not only necessary to allow water to run into the lower chambers, but water had to be forced into the top compartments at the sides, to overcome the buoyancy of the material; while in the iron structure provision had to be made to prevent the dock sinking when the lower chambers were filled with water. To accomplish this, the upper part of the side walls was divided into compartments, forming permanent air-chambers, or floats, of a capacity sufficient to maintain the decks of the side walls from 6 ft. to 8 ft. above the water-level. The author laid stress on the importance of these for the safety of iron floating docks. As an instance of the success of the Cartagena Dock, he mentioned that the *Numancia*, of 5,600 tons weight, had been supported on it for a period of eighty days. A list was then given of wood and iron floating docks which had come under the author's notice, all of which were of rectangular-shaped sections, with the exception of the *Bermuda*, which was of a U section. The depth of the basement or lifting-chamber, of a floating dock, like that at Cartagena, mainly depended on the lifting power required. The thickness of the plates of the shell was $\frac{5}{8}$ in. and $1\frac{1}{4}$ in. in the centre part. For such a vessel as the *Numancia*, weighing 5,600 tons, the strain was estimated to be 1·32 ton per square inch, and for a vessel weighing 20 tons per lineal foot, 1·5 ton per square inch.

Of the different plans of conveying docks to their destination, it was remarked that that of Pola was built at and towed from Venice; that of Havannah, from New Orleans; that of Alexandria, from France; and the *Bermuda*, from the Thames; while those of Cartagena, Ferrol, &c., were sent out in pieces and erected at the respective ports.

The dock at Cartagena is 324 ft. in length, 105 ft. in breadth, and 48 ft. in height outside; these dimensions of the dock at Ferrol are 350 ft., 105 ft., and 50 ft. respectively.

WATER-TIGHT BASINS.

SIR,—Will any of your readers kindly inform me by what means I can effectually retain the water in the basin of a fountain? The reservoir is built of ashlar stone in courses, and was well puddled behind the stonework. The escape of water is in the joints betwixt the upper and lower stones. I have had the joints filled with Roman and Portland cement, but the weather or some other cause renders either of no use. M.

SCHOOLS OF ART AND OF SCIENCE.

The Rochester and Chatham Art Schools.—The annual distribution of prizes to the successful competitors studying at St. Mary's and St. Mark's Art Schools has taken place in the National School-room, Military-road. Notwithstanding the inclement nature of the weather, there was a large attendance of the friends of the students. Previously to the proceedings commencing opportunity was given to inspect the drawings and water-colours executed by the students, which were hung round the walls of the room. The High Constable (Mr. H. P. Mann) presided, and briefly opened the proceedings by requesting Capt. W. C. Chamberlain, superintendent of Chatham dockyard, to present the prizes to the students.

TENDERS FOR KENNINGTON WORKHOUSE.

AT a meeting of the Lambeth guardians, on the 18th ult., Mr. Henshaw, who last week tendered to erect the new workhouse at a cost of 42,784*l.*, and whose tender, being the lowest, was accepted, waited upon the Board, and said he had made a mistake of 1,500*l.* in his tender, and asked that his contract might be altered. With the 1,500*l.* added, his contract would still be 100*l.* less than the next lowest. After some discussion, it was decided that Mr. Henshaw's request, in justice to the other contractors, could not be granted.*

DISSENTING CHURCH-BUILDING NEWS.

Darlington.—The chief stone of a new Primitive Methodist Chapel has been laid at Albert-hill. Besides the chapel, it is also contemplated to build schools. The chapel and schools will be in Haughton-lane, and the architectural design is in the plain Early English style. The chapel alone will contain seats for 350 people, and the schools, which will be separated from the chapel by a movable partition, will provide accommodation for 200 children, so that in case of necessity sufficient room can be made for a congregation of 550. It is expected that the building will be completed by the beginning of March next. Mr. R. B. Dixon is the architect; and the contractors are Mr. R. Martin, bricklayer; Mr. Dobinson, joiner; Mr. Wandless, slater; Mr. Johnson, plumber; and Messrs. Davidson & Son, painters.

Liverpool.—The foundation-stone of a new chapel and schools in connexion with the United Methodist Free Church has been laid in Wellington-road, Toxteth-park. The chapel is to be in the Italian style of architecture, and will be built with patent red brick and Stourton stone dressings. It will be 61 ft. long by 41 ft. wide, and 28 ft. high, and will accommodate on ground and gallery floors 650 persons. The exterior elevation in Wellington-road will have a centre gable pierced with a three-light window, under which will be the entrance to the church through two doorways leading into a corridor to the ground floor and gallery stairs. A large school-room will be in the basement, the full size of the church; and the usual accommodation of class-rooms and vestries is to be provided. The contract for the building and boundary walls is 2,770*l.*; but the total cost, including ground, is to be 3,600*l.* The works are being carried out by Mr. Thomas Bridge, of Burscough, from the plans and under the superintendence of Mr. W. J. Mason, architect.

SCHOOL-BUILDING NEWS.

Liverpool.—New national schools in Toxteth Park have been inaugurated, in connexion with St. Silas's Church. The schools occupy a site near High Park-street, immediately to the south of the churchyard, and of the same depth (152 ft.) from east to west, and with a width of 108 ft. from north to south. This site was purchased for the schools, at a cost of 912*l.*, from the Earl of Sefton, by the Liverpool Church and School Extension Society. The main building has the general form on plan of the letter L, the upper arm of the figure comprising, on two floors, the boys' and girls' schools, with the master's house at the northern extremity, and the lower arm forming the infant school and class-room. The building is very simple, Mediæval in character, but making no pretensions to architectural display, any effect it possesses being derived from the arrangement of its parts, and from the grouping and treatment of the window and other openings. The materials consist of ordinary brick, with dressings of red sandstone in moderate quantity, while the timber, showing internally in the roofs, bearers, &c., is pitch pine, slightly stained and varnished. The accommodation is for 729 children,—viz., 200 boys, 229 girls, and 300 infants. The boys' school, on the ground floor of the principal or west block of the building, is 67 ft. 6 in. by 20 ft., and 14 ft. 6 in. high. It is entered by a porch at its northern end, from the playground at the back, and has two class-rooms attached, and a cloak-room and lavatory. It is lighted by windows on both sides, and has a fire-place at each end. The girls' school is in the upper story of the same block as the boys', and also 67 ft. 6 in. by 20 ft.; it is 11 ft. 6 in. high to the wall-plate, and 21 ft. to the ridge of the roof. It has also two class-rooms. The larger class-room can be thrown into the school by opening double folding wooden partitions, felted on their inner sides to deaden sound, the whole forming thus one room of large dimensions. This school is also furnished with a cloak-room, lavatory, and book-closet; it has likewise thorough light and two fireplaces, as the boys'. The staircase entrance is carried up to a third story, forming a bell-turret, oblong on plan, with a slated roof, finishing with ornamental iron cresting partly gilded. A separate stone stair leads from the upper landing of the entrance stair to the girls' playground. The infant school is entered from the north side, with cloak-room and lavatory, as in the other schools. It is 67 ft. by 24 ft., and 15 ft. 10 in. high to the wall-plate, and 24 ft. 6 in. to the apex of the roof. It is lighted by windows on both sides, and has two fireplaces on the south side; connected with it at its east end is a class-room capable of being thrown in with the main room by double wooden felted partitions, as in the girls' school; it has also a book-closet and separate entrance from the play-ground, which the infants share with the girls. The master's house at the northern extremity of the west block comprises, on the ground floor, parlour, kitchen, scullery, entrance, and staircase; on the first floor, three bedrooms, and two attic-rooms above them. A small boiler-house, opening from the girls' playground, is provided, affording means of supply on occasions of tea-parties, &c.; and out-offices and water supply are connected with each school. The roofs of the girls' and infant schools are formed with a double pitch, the upper parts being less steep than the lower. Some of the galleries or graduated platforms are made movable, and capable also of being converted into flat platforms. These schools were the subject of a limited competition among local architects, and the plans worked out from the selected design (by Mr. H. P. Horner) were approved by the Committee of Privy Council on Education without suggestion for alteration. The buildings, general fittings, and furniture were contracted for by Messrs. Reeves & Whitby, of Peel-street, for the sum of 2,990*l.* The gas-fittings were the subject of a separate contract with Messrs. Peet.

Oxford.—A new Infant School for St. Ebbe's parish having been lately built in Paradise-square, mainly through the exertions of the rector, the Rev. E. P. Hathaway, the ceremony of opening the building has been celebrated by a tea party given in the schools. The new building will accommodate 100 infants, according to the Government regulations as to superficial area; while the cubic space in the principal building and class-room is equal to that which the Education Department requires for 150 children. The new school has been joined to the girls' school, large folding doors only separating the two, so that on the occasions of public meetings or tea parties one large room may be made of the whole by throwing open the folding doors. Mr. Basil Champneys, son of the Dean of Lichfield, who was formerly curate in charge of the parish, was the architect; and Mr. Symm, of Oxford, the builder.

Wortham.—A new school-room, 40 ft. by 20 ft. and 12 ft. high, has just been opened in this parish. It was built at the expense of the rector, who has thus anticipated the requirements of the Education Act for some years to come. The parish was in favour of a voluntary rate, and one of 3d. in the pound has been made. The opening of the new school was celebrated by a treat to all the mothers and children to whom the new Act applies.

New Basford.—The inscription-stone of the British schools at New Basford has been laid. The site is on the Nottingham-road, opposite Mr. Ashwell's bleach works. The plans were prepared by Mr. J. Gilbert. The proposed outlay is 1,920*l.* 18*s.* 1*d.* The schools when erected will be capable of accommodating 400 boys, girls, and infants, in three different rooms.

Hereford.—The new schools for the parish of All Saints have been opened. The school-house has been erected by Messrs. Welsh & Son, from the designs and under the superintendence of Mr. F. R. Kempson, of this city, architect, the cost, about 1,500*l.*, being defrayed by subscriptions raised in the parish. The foundation-stone was laid by Lady Saye and Sele in July last. With the exception of certain of the school fittings, the work is now completed. The building is divided into six rooms, three (of considerable dimensions both as to height and length) being the schoolrooms proper,—one for boys, a second for girls, the third for infants,—and the remaining three are class-rooms. The accommodation afforded is for 450 children.

Old Woodstock, Oxon. — The new Infant Schools and teachers' residence was opened on the 9th. The buildings are situated in the northern extremity of the village, adjoining Blenheim Park. The walls have been built with random-coursed rubble-work of local stone, with Bath stone dressings. and the roofs have been covered with Staffordshire tiling. The works have been executed by Messrs. George Wyatt & Son, of Oxford, under the architect, Mr. John Birch.

FROM IRELAND.

Drumbeg.—The new church for the parish of Drumbeg has been consecrated by the Bishop of Down and Connor and Dromore. The new edifice, which is situated over the Drum Bridge, in the valley of the Lagan, is of simple architectural detail, such as prevailed in the thirteenth century. The ancient churches of this diocese and part of Ireland possessed a somewhat distinctive style of architecture, the churhes built in the simple and convenient form of the letter T transepts being without intervening arches, and the cross intersecting with that of the nave. Beyond the top of the T the building is somewhat prolonged, and terminated with an apse, forming five sides of an octagon figure. This portion of the church opens into the nave with a lofty chancel arch. The nave internally measures 62 ft. by 23 ft. the transept 23 ft. by 19 ft. A little apart from the south-west angles stands the tower of the former church. The spire was built by the late Mr. John Charley, and is now applied as the principal entrance to the church, being connected with it by a short intervening passage; the old door has been removed, and a new porch with a double recessed pointed arch and gable, surmounted by a finial, brings this portion of the structure into harmony with the new church; a ceiling of moulded beams and timber, stained and varnished, serving as a floor for the bell-ringers, has been added. At the east side of the south transept stands the vestry, which has a separate porch, robing-room, &c.; underneath is placed an apparatus by which the whole building is heated with hot water. The chancel internally constitutes the principal feature of the church; it is of the same width as the nave, and some 9 ft. in depth, its area, however, being conveniently prolonged into the nave as a kind of platform surmounted by a stone kerb, which brings the pulpit and desks well out in front of the transepts. The floor is laid with encaustic tiles at the expense of a member of the congregation. Each side of the apse towards the east, south-east, and north-east is finished with a gable filled with a traceried window. Each of these windows has been filled with stained glass, executed by Messrs. Heaton, Butler, & Bayne, of London, the subjects in each being as follows:—North-east, the Sacrifice of Isaac and the Brazen Serpent; east, the Passover and the institution of the Lord's Supper; south-east, the Agony, and the Journey to Emmaus. The southern transept has two long lancet lights, also filled in with stained glass by Messrs. Ward & Hughes, the subjects being the Covenant between David and Jonathan and the Death of Jonathan in battle. The western gable, which is the principal feature seen from the road, has in the lower portion an arcade of six lights. In the tympanum of the gable is a long lancet light, surmounted by a cross of Irish character. Internally the roofs are open timbered and stained, and in a combination of carved struts with the beams and string-posts moulded and rounded like columns; the seats are also open and stained. The chancel arch is of two orders, and springs from columns of red-tinted stone with sculptured capitals. The pulpit, which is of stone, is circular, and enriched with sculpture. The Bible-desk and prayer-desk are both of oak, and were executed by Mr. Digges, of Dublin, from Mr. Drew's design. The church has been erected at an expense of about 2,500*l.*, from the design of Mr. Thomas Drew. Messrs. Fitzpatrick, Bros., carried out the work.

* Mr. Crockett wishes it stated that his tender was 44,390*l.*, instead of 43,390*l.*, as printed; and Messrs. Rider say their tender was 44,918*l.*, not 45,918*l.* The list came to us officially, and was printed correctly.

PROVINCIAL NEWS.

Pontefract.—During the ensuing year considerable improvements are contemplated to be made in Pontefract. Amongst the most important is the erection of a corn exchange, a building very much needed in a town which is the centre of a large agricultural district, and celebrated for its numerous malt-kilns. The street commissioners have under their consideration the formation of new waterworks, as the present works are inadequate for the wants of the town. It has been suggested that a sufficient supply can be obtained from the hill in the park, and with a view of ascertaining whether such is the fact, a committee has been formed to employ a competent person to examine the hill and report on the subject. The next most important is the widening of Finkle-street, the narrowest and busiest thoroughfare in the town, and the principal road to the railway station. After an agitation of several years' duration, the directors of the Lancashire and Yorkshire Railway have agreed to erect a passenger station at the Tanshelf end of the town. A new militia depôt, which has cost over 7,000*l.*, including the site, is just about completed, in the centre of the town. There are several other improvements of a minor nature which will also be shortly made.

Wigan.—The foundation-stone of a new infirmary has been laid at Wigan. The undertaking was virtually commenced by Mr. John Lancaster, M.P., who offered a subscription of 3,000*l.*; the Wigan Coal and Iron Company gave 3,000*l.* more, the late Earl Crawford promised 2,000*l.*, and his son, Lord Lindsay (the present earl), 1,000*l.*, while the Misses Gidlow contributed 2,000*l.* These, with smaller subscriptions, inclusive of the available funds of the existing dispensary, make a total of over 28,000*l.*; so the committee have begun to erect the building. The architect is Mr. Worthington, of Manchester; the builder, Mr. J. Wilson, of Wigan; and the work has so far progressed that the corner-stone has been laid by the Earl of Crawford and Balcarres. The site elected is the crest of the hill on the north side of the town.

Elsecar. — Earl Fitzwilliam has conferred a boon on the thriving village of Elsecar and its neighbourhood by erecting, at his sole expense, a large and commodious covered market-hall, which has been opened. The hall, designed by Mr. Dickie, of Wentworth, is built of stone, with slated roof, supported by iron pillars.

Leek.—The Alsop Memorial Hospital has recently been opened to the public here. The chief feature is the two large wards, each 27 ft. by 14 ft., which are intended for four beds each; that for the males being on the ground floor, and the females immediately over it on the chamber. A corridor the whole length of the ward separates it on both floors from the men's and women's special wards (for two beds each), the operating-room, and the baths, lavatories, and water-closets; and all this portion of the building is divided by the hall and landing over it from the more domestic department,—comprising the kitchen, scullery, pantry, and waiting-room for patients and visitors, and above these the three bedrooms for nurses and assistants, and the linen-closet, &c.; there is also another commodious bedroom and store-room, lighted by dormer lights, in the roof. The mortuary is a detached building in the yard, on the north side; and the wash-house and other out-offices are also detached. The hospital is warmed throughout by the hot-air apparatus of Messrs. Haden & Son, of Trowbridge, which is placed in the basement story of the building. Open fireplaces have been retained in each room in addition to the warming apparatus. The building is of red brick, relieved by plain and moulded stone strings, and the jambs, mullions, and heads of the windows are also of stone. The windows have pointed arches in coloured brick and stone, with label mouldings, the spandrels being filled with pierced, traceried stone heads, or dark-coloured tiles. The woodwork in the interior is varnished without staining, the figure being preserved. The walls are coloured in tints of quiet tone; a skirting of porcelain-faced white bricks is built into those of the wards, instead of the ordinary woodwork, as being capable of more thorough cleaning in the necessarily frequent washing of the floors, &c. The fireplaces have mantel-pieces of moulded stone, the jambs of which are filled with pictorial tiles, and the hearths laid with glazed dark-coloured tiles. The architect was Mr. Sugden; and the work has been carried out by Messrs. Nadin, Hudson, & Philips; the stone carving is by Messrs. Williams, of Manchester.

Malpas.—A committee appointed to get up a memorial to Mr. T. T. Drake, for a plot of land on which to build a new public room, has obtained the signatures of nearly every householder in the township; and at a public meeting to further consider the subject, the Rev. Chancellor Thurlow was called upon to preside, and expressed his sympathy with the object, and promised to head the subscription with 50*l.*, and to write to Mr. T. T. Drake, and forward the memorial to him, and do all he could to carry out the desire of the inhabitants of the town. He thought, however, that a coffee-room would be a desirable addition to the building, if the reading-rooms were there and the clubs held their meetings there.

Bradford.—The new offices of the Third Equitable Building Society, New Market-street, are now occupied. The society numbers over 6,000 members, and last year the total receipts were 373,634*l.*, while the advances on mortgage during the same period amounted to 136,340*l.* The buildings in which the new offices are situated stand next the Mechanics' Institute, and form no inconsiderable portion of the range of premises which have been erected between Tyrrel-street and New Market-street. The whole pile covers an area of upwards of 900 square yards, has a frontage of 132 ft. to Market-street, 86 ft. to Tyrrel-street, and is 60 ft. high from street level to top of balustrade. The ground floor is divided into thirteen shops, the cellars under them being arranged so that they can either be let with the shops or separately. The whole of the first floor is intended to be occupied for the purposes of the Third Equitable Building Society, and the second and third floors are to form Mr. Holden's new dining-rooms. Three large staircases are arranged to give access to the different floors, and to communicate with each other. They are approached from the streets by three entrances, two being in Market-street and one in Tyrrel-street. In the centre of the building are two well-lights, lined with white glazed bricks, the reflected light from which makes the back rooms almost as light as those having windows to the streets. The floors are fireproof, being constructed on Messrs. Philipps's patent, with rolled Belgian iron and concrete. The style of architecture is Italian of ornate description. The eight shops of the Market-street front are divided by coupled and banded columns with carved capitals which support a decorated frieze and cornice. In this frieze and over the columns are carved bosses in circular panels, partly encircled with sprays of natural foliage varied in design and cut in flat relief. The lines of the shop columns are continued to the eaves of the building by two heights of pilasters which divide the front into eight bays. The upper series, the height of two stories, are panelled and carved on their faces, and have carved Corinthian capitals and entablatures. All the windows above the shops are deeply recessed, and are divided into two and three lights by detached column mullions, having moulded bases and carved capitals. An eaves cornice and a perforated balustrade, broken at the pilaster lines by chimney-stacks, give a finish to the front. The five shops of Tyrrel-street front are divided by stone piers, the moulded and carved angles of which are continued along the shop frieze. Carved and festooned trusses at the top of these piers support the shop cornice and break the line of the frieze. The windows of the stories above the shops are divided by mullions into two and three lights. This front is finished with a block cornice at the eaves. Both fronts are built with cleansed stone from Mr. Neill's quarry, near Windhill. It is of a hard close-grained quality, similar to Cliff Wood Quarry, of which the Town-hall is to be built, but of a warmer tint. The whole of the labour in dressing the stone (except the moulded parts) has been done by machinery. The contractor for masons', joiners', plumbers', and slaters' work was Mr. Archibald Neill; and for the plasterers' work Mr. John Laycock. Messrs. Fielding & Dark, of Leeds, have done the carving of the Market-street front, and Mr. Stake, of Bradford, the Tyrrel-street front. Mr. T. C. Hope, of Bradford, was the architect.

Bath.—The purchase of the property required by the Midland Railway Company for widening the approach to their station from Queen-square, has been completed, and it is anticipated that the work will ere long be taken in hand. The direct route from the station in Seymour-street to the centre of the city will be through Charles-street, crossing New King-street and Monmouth-street. Thus far the existing thoroughfare will serve, but on reaching Chapel-row the road will cut off a portion of the buildings on the left hand side of the street, while at the upper end it will traverse a portion of the site of the present Queen-square chapel, which, of course, will have to be taken down, the building having been already purchased by the company, and the claims of the incumbent settled. The church, which is to replace St. Mary's Chapel, will be built on what is now a stoneyard occupied by Mr. Reeves, mason, and the site of the old Elephant and Castle.

STAINED GLASS.

St. Andrew's, Sharrow.—A window has just been erected to the memory of the first vestry warden of this church, Mr. William Whitehead, of Sharrow Head. The window contains two subjects in the lower lights, viz., the Offering of the Princes to the Tabernacle, recorded in Numbers vii., which consist of silver and golden chargers and bowls, fine flour, young bullocks, rams, and kids of goats of the first year, and are received by Aaron and Moses at the Tabernacle, before the altar. The richly-wrought veil of scarlet, blue, and purple, with leaves of palm and cherubic adornment, is represented. In the background the wagons are indicated which contained the offerings for the use of the Tabernacle. The second subject represents the offering of the people for the repairs of the Temple during the reign of Josiah, and the priesthood of Hilkiah, recorded 2 Kings xxii., when they were delivered unto the "carpenters, masons, and builders, to buy timber and hew stone to repair the house." In the foreground the Jews are delivering their contributions to the treasurer; in the background a Levite is paying some to a builder; while a mason is engaged on the building, and blocks of stone and scaffolding indicate that repairs are going on. The subjects are set upon an ornamental base, beneath a canopy upon a grisaille ground enriched with lines of colour, and surrounded by coloured borders. In the tracery, Moses, with the Tables of the Law, forms its central feature, and in other parts Masonic signs are represented, indicative of the order to which the deceased belonged. The colouring is designed to convey a soft, warm light. Mr. T. W. Camm, of Smethwick, near Birmingham, was the artist.

Dorrington Church.—A stained-glass window has been placed in the chancel of this church in memory of Mr. W. J. Hope Edwardes, late captain of the 5th company of Shropshire Rifle Volunteers. The window consists of three openings, the centre one being subscribed for by the officers and men of the 5th company, the subjects chosen being the Crucifixion and the Ascension. The two outside openings were given by the Netley family. The subjects of these are the Nativity, the Baptism, the Agony in the Garden, the Last Supper, Bearing the Cross, and the Resurrection. The style of the window is Early English, the subjects being enclosed in panels, an enriched border running round each light. The design, colouring, and execution of the window were under the personal superintendence of Mr. Reginald Cholmondeley, Condover Hall. The window was supplied by Mr. John Robinson, of Shrewsbury and Dorrington, decorator, and executed by Messrs. Done & Davies. Mr. Robinson has just supplied new windows of cathedral tinted glass to Kinnerley Church.

Laughton Church.—The old church of Laughton-en-le-Morthen has lately received a decoration, in the form of a memorial window, to the memory of the late Mr. James Barton, of Laughton, erected by his son, Mr. Edwin Barton. It is a large three-light window in the south side of the chancel, the work of Messrs. Meyor, of Munich. The subject is the Transfiguration. The tracery of the upper part of the window is filled with small figures of angels, &c.

Church of St. Peter in Eastgate and St. Margaret, Lincoln.—Some months ago a painted window to the memory of the Rev. G. Rigg, the late incumbent, was put up in this church. Another window has now been placed there by Mr. Frederick Burton, of this city, in memory of his daughter. It is the central window on the south side, and has two lights, containing four medallions. In the dexter light are represented the call of St. Peter and St. Andrew, and our Lord's Temptation; in the sinister the Sermon on the Mount and the Purification of the Temple.

The subjects selected form part of a series of Scriptural illustrations, which have been chosen for the whole church: each window, as yet unfilled with painted glass, has its subjects already designed, and all are intended to be the work of one firm, Messrs. Ward & Hughes, of Soho, so that a certain completeness and uniformity may be the result.

VARIORUM.

"MILITARY CHESS: the new Strategic Game, representing the Movements of Modern Warfare. By Charles Edward Conder, C.E. Mead & Co., Cheapside." A little book of rules, and a perspective view of the military chess-board, with its forts, river, and bridge; its cuirassiers, hussars, and fusiliers; its Moncrieff guns, heavy guns, and field guns; has been sent to us for a notice which we readily afford to the ingenious invention of an occasional contributor to our own columns. The game has evidently been very carefully considered, and bears the impress of much thought, as well as of mathematical knowledge and of acquaintance with much of the technical detail of modern warfare. It is obvious, from a consideration of the antiquity of the game of chess, that its moves and rules can only bear a very faint resemblance to the military action of the day. The obliquely-moving pieces, which are called (we hope not for this reason) bishops, represent archers, and are so portrayed in some of the Oriental sets of chessmen. The rooks seem to have been originally elephants, the straightforward trample of their enormous bulk bearing down all resistance. The queen, or mayor of the palace, is a perfect anomaly, according to modern notions. In Mr. Conder's game the standard replaces the king of the chess-board: it moves only over two squares at a time, and its capture decides the game. The Moncrieff gun, limited in its movement, has range unlimited on its field. It requires three fires to be concentrated on it to silence it, and it cannot be dismounted. We have heard the game well spoken of by the military men into whose hands it has already fallen, and we have pleasure in directing attention to Military Chess.——The *Academy* says, the study of the interesting class of lapidary inscriptions known as *Ogham* inscriptions, which are found in many localities in the South of Ireland, has latterly received a great impetus through the labours of Dr. Samuel Ferguson, deputy keeper of the Records of Ireland. He has already secured accurate paper moulds of about forty of these inscribed stones, from which metal casts can be taken. The moulds are at present arranged in the Royal Irish Academy, where Dr. Ferguson also intends to deposit a series of casts, which will, in fact, serve as the foundation of an Ogham museum, and place the study of this heretofore obscure class of inscriptions for the first time on a sound basis.

Miscellanea.

Instruction in Science and Art for Women.—Professor Guthrie has resumed his advanced course of lectures on "Heat and Light" at the South Kensington Museum. Having in his previous lecture considered some of the circumstances which influence the direction of rays of light reflected from different metallic surfaces, and the formation of images in concave and convex mirrors, Professor Guthrie now proceeded to establish and illustrate additional facts bearing upon the same subject, but more particularly with reference to transparent surfaces. Professor Guthrie has since delivered another of his advanced course of lectures on "Heat and Light" at the Museum, commencing with some experiments to illustrate the different refractive powers or refractive indices of different kinds of liquids, such as paraffine and water. The lecture mainly related to the organisation of the eye and the relationship of light to that organism.

Asphalte in Pall-mall.—At the St. James's Westminster vestry, a letter has been read from the secretary of the Reform Club, requesting the appointment of an early day for a conference between the representatives of various clubs in Pall-mall and a vestry committee on the subject of the substitution of Val de Travera asphalte for the paved roadway in Pall-mall. The vestry fixed the 25th inst. for the conference, and appointed a committee of seven members.

Fever in the Turvey District, Bedford. A report has been made on the prevalence of fever in the Turvey sub-registration district, by Dr. R. Thorne Thorne. The reporter recommends that,—1, a thorough and effective system of disinfection should be carried out in Stevington, and the filthy accumulations with which the village abounds removed. Preparations should at once be made in Turvey and in Stagsden to prevent, by disinfection, and as far as possible by isolation of cases, the spread of the disease into those villages. The necessity for this step is especially urgent in Turvey. 2, means should, with as little delay as possible, be adopted in order to prevent the excrement and refuse nuisances which in Stevington have been aptly termed, in Dr. Prior's report, as "a shame to civilisation," and which to some extent prevail also in Turvey and in Stagsden. In acting upon this recommendation the local authorities will, in the absence of the water-closet system, which is hardly likely to be generally adopted, have the choice of (*a*) the dry-earth system, (*b*) the midden-stead system. In Stevington the privy accommodation is so scandalous, that nothing short of an entirely new system, from one end of the village to the other, can be considered as an effectual remedy. The abundance of clay, both in the village and in its neighbourhood, supplies the authority with a soil which, for the purposes of the dry-earth system, stands almost first in rank. A new and immediate public water-supply for Stevington is also recommended.

Science Teachers at South Kensington. Regulations have been issued by the Science and Art Department with regard to science teachers who wish to attend the special (six weeks') courses for training in teaching at South Kensington in June, July, and August, in accordance with the circular of September, 1870. These applications are so numerous that it is impossible for the Department to make the selection of teachers to attend, as was originally proposed. The Department has, therefore, decided to make the selection by competition at the next May examinations. The teachers who answer best, probably to the number of about forty-five in each group, will be allowed to come to London for the six weeks' course of training. They will receive their travelling expenses,—namely, second-class railway fare, and 30s. a week while in London. The results of the teachers' examination will not be published, but if a candidate wishes his success recorded, it will be done in the ordinary way. The biology course will commence on the 14th June, and the course on experimental physics on the 5th July.

Contractors' Quantities. — At the last meeting of the Metropolitan Board of Works, Mr. Runtz moved the adoption of a report from the Works and General Purposes Committee, stating, with reference to the question of quantities, &c., in connexion with the contracts for the works of the Board, that the committee do not consider it advisable that the Board should undertake any responsibility in respect of quantities upon which contractors tender for the Board's works, and recommending that the quantities necessary for the Board's estimates be taken out in the engineer's department, whilst contractors be left to accept the quantities of any person they may think proper, as the basis of their tenders. Mr. H. Lowman Taylor seconded the motion, which was agreed to.

Small-pox Hospital in Westminster. — The St. George's, Hanover-square, Union Board of Guardians have just adopted a report of the Petty France Workhouse (York-street) Visiting Committee, setting out that they are about to erect a temporary iron hospital for small-pox cases at St. Ermin's-hill, Broadway, Westminster. The building will be 130 ft. by 20 ft., and accommodate forty patients, giving to each 850 cubic feet, as required by the Poor-law Board. The cost will be 580*l*., including brick foundations, cistern for water, drains, &c. The building will be ready in twenty-one working days.

A New Musical Instrument.—In Edinburgh, it seems, a new musical instrument is now being exhibited. It is described in the *English Mechanic* as a keyed instrument of six octaves, resembling an harmonium in general form, but very different in mechanism. The sounds are produced by the friction of wooden hammers against a revolving cylinder of wood, set in motion by the feet. The tones produced are said to be very sweet and wonderfully varied. "One can sometimes hardly believe they are not those of a wind instrument."

Fire in a Church Spire.—St. Saviour's Church, at Bamber Bridge, near Preston, at the higher end of the village, got on fire. Sparks were observed to be coming out of the top part of the spire, under which there is a flue, and continued to increase. The beams which cross each other, and are inserted for the purpose of strengthening the stonework, were all in flames. With much difficulty the flames were got under. All the higher beams in the spire were burnt away, and some of the lower ones were damaged. The fire is supposed to have originated through the over-heating of the flue which runs through a portion of the spire. Fears were entertained that the spire would fall, in consequence of the supporting-beams having been burnt out; but, so far, the masonry has kept up all right, and it was shortly to be made secure again.

Proposed Church at Hebburn.—A meeting of several of the influential inhabitants of the parish of Jarrow-on-Tyne has been held to consider the best means for providing a church for that district. The Chairman said,—"Four years ago the late Colonel Ellison had promised to give a site and to build a church, but owing to his death the scheme was not carried out. He was glad to announce that Mr. Carr, the present owner of the property, had offered to give a site for the church, and to contribute liberally to the building fund. The church was to consist for the present of a nave to accommodate 300, hereafter to be enlarged by the addition of a chancel and transepts, to accommodate 600." Resolutions were passed thanking Mr. Carr for his liberal offer, forming a building committee, and appointing Mr. F. R. Wilson architect.

Restoration in Dover Castle Keep.—When Lord Granville, and subsequently his guest, Mr. Gladstone, paid a visit to this Norman donjon last summer, they were struck with the ruinous and even dangerous appearance presented by the south-eastern vestibule, commonly known as King John's Chapel, within a recess of the stone staircase landing-place. A sufficient sum of money, some 500*l*., was placed in the hands of the proper authorities, and the work of restoring the tracery and mouldings of the lower and upper chambers was entrusted to the Royal Engineers stationed there, who have made rapid progress towards completing the plans of their commanding officers.

Novelty in Pumping.—There has been recently introduced at Halbeath Colliery, Fifeshire, Scotland, an improved system of driving pumping machinery for mines, which is likely, says the *Scotsman*, to attract attention, as it has proved very successful. The object is to provide efficiently for the great variation of strain in heavy pumping by bell cranks. This is attained by applying the patent Corliss system of steam engine, made by Mr. Douglas, of Dunnikier Foundry. The specialty is that this engine supplies itself at every movement with the exact amount of steam required to overcome the resistance at the time, and casts off the supply of steam whenever the load or strain is surmounted, thus ensuring the greatest steadiness of movement and the most economical use of steam and fuel.

Society for the Encouragement of the Fine Arts.—The thirteenth session of this society has been inaugurated by a *conversazione* at the Suffolk-street Gallery, Pall-mall, which was lent for the occasion by the council of the Society of British artists. The *conversazione* was very numerously attended. In the course of the evening Dr. Heinemann, professor and lecturer at the Crystal Palace, delivered an address on the principles and objects of the society, and a programme of vocal and instrumental music was gone through, under the guidance of Mr. Alfred Gilbert, the hon. musical director of the society.

Soane Museum Trustees.—In consequence of the decease of the late Mr. Philip Hardwick, R.A., and the resignation of Sir Frederick Pollock, trustees of the Soane Museum, the remaining trustees have filled up the first vacancy by electing Professor Donaldson; and Mr. Frederick Ouvry, Honorary Solicitor of the Institute, succeeds to Sir Frederick Pollock.

Trade in Gloucester.—The contract for the construction of the new entrance and docks near Sharpness Point, the mouth of the Gloucester and Berkeley Canal, has been let to Mr. George Wythes, of Bickley Park, Kent.

The Influence of Heat and Cold on Human Life.—In his annual report on the public health, for the *Birmingham Gazette*, Mr. Thomas L. Plant, F.M.S., says:—"The year opened with a high death-rate, following the severe weather which prevailed in the last week of December, 1869. The mortality declined with the mild temperature in January, but was raised again when the cold weather succeeded at the end of that month. February entered with high temperature, which had the effect of reducing the death-rate of the ten large towns from 30·9 to 27·7 for the week ending February 12. But the severe frost in the second week of that month brought up the death-rate to 29·9 for the week ending February 26. This large and sudden increase was mostly in consequence of the fatality of the diseases of the respiratory organs. From this period to the second week in June the public health slowly but gradually improved. The death-rate for the week ending June 11th was only 19·7. The superior summer temperature which prevailed in June, July, and August, brought on much fatal diarrhœa, and raised the death-rate of the ten towns to 32 5 for the week ending August 13th. The decline of temperature reduced the mortality from diarrhœa, and the death-rate went down to 23·1 for the week ending October 1st." The recurrence of the cold in the present winter, as he points out, is again raising the death-rate:—"The annual death-rate of the ten large towns for the week ending December 31st was no less than 32 per 1,000, which is an increase of 6·5 per 1,000 on the previous week. No one can wonder at this, seeing the intense cold which has prevailed. The mean temperature of the twelve days ending January 1st was 22 5, being 14 degrees below the average, and the lowest ever known or registered for twelve consecutive days. Such terrible cold in this climate is incompatible with human endurance. The sufferings of the poor must be dreadful at this time. To alleviate the calamity by prompt measures of relief to the poor during this most inclement season will tax all the efforts of the authorities in every town throughout the kingdom."

The Thames Embankment.—A body of workmen last week commenced the removal of the iron palings and brick wall at the bottom of Norfolk-street, in order to open that thoroughfare from the Strand to the Thames Embankment. Norfolk-street, the widest street on the south side of the Strand, has hitherto been a *cul de sac*, but will now be the main thoroughfare from the Strand to the Embankment; Arundel-street on the east and Surrey-street on the west being very narrow and incapable of receiving much traffic. From the Temple-gardens to Somerset-house there is a semicircular loop road, and this will be reached from Norfolk-street by means of arches, which will become necessary in consequence of the inequality of the ground. The thoroughfare thus opened will be directly opposite to the Temple Station of the Metropolitan District Railway, to which it will form the main approach. There is a Bill before Parliament for the construction of a new street from the Temple Station to New Oxford-street, and in the event of this being carried, a very large portion of Norfolk-street, Surrey-street, and Howard-street—all on the Duke of Norfolk's estate—will be pulled down. This was the site which was proposed by the Chancellor of the Exchequer (Mr. Lowe) for the New Law Courts.

The late Mr. Brassey.—A correspondent writes,—Perhaps the following anecdote of the late Mr. Brassey may be of interest. I have it from a gentleman who was one of Mr. Brassey's agents, on the Rouen and Havre Railway:—My friend well remembers the fall of the Barentin Viaduct, which was owing, he thinks, not to any faults of design, but partly to the treacherous nature of the river bed, and partly to the force of the stream, swollen, as it was, by recent rains. In the midst of the confusion and despair which followed the downfall of the arches (mingled also with the rejoicings of the French engineers and contractors, who were exceedingly jealous of the English), Mr. Brassey appeared on the scene. Without blaming or accusing any of his subordinates, he set them to work again on the foundations of the various piers, and offered 200*l.* to the man who should be the first to raise a good foundation above the level of the water. The line was afterwards opened within the time named in the agreement with the French Government, failing which the most serious consequences would have followed.

Metropolitan Board of Works.—An approximate balance-sheet of the general accounts to the 1st of January, 1871, which has been presented to the Board, shows liabilities to the amount of 24,087*l.* 9s. 3d., and assets 120,242*l.* 1s. 3d., showing a balance of 96,154*l.* 12s., made-up working expenses, reserve 60,000*l.*, and surplus, including 25,000*l.* from the Metropolis Sewage and Essex Reclamation Company, 36,154*l.* 12s. In addition to this account, there is a sum receivable from the main drainage account, in respect of works at Abbey Mills pumping-station, probably 13,000*l.* An estimate of the sums required to be raised from parishes, districts, &c., for 1871 was presented, and the consideration of the subject was adjourned. The document showed a total charge for 1870 of 399,306*l.* 14s. 4d., equivalent to a rate of 5·12d. in the pound on the total rental of the metropolis (18,719,237*l.*) for the year; and the total estimated charge for 1871 is 260,862*l.* 6s. 8d., equal to a rate of 3·35d. in the pound on the present rental of 18,683,288*l.* The estimates for the present year are in nearly every respect lower than those of the past year. The general account for 1871 is estimated at 53,432*l.*, as against 55,105*l.* in 1870; the main drainage, 107,838, against 233,990*l.*; and the total expenses of the Board, 68,911*l.*, against 87,637*l.* in 1870.

Boiler Explosions.—At a conference on the subject of boiler explosions which has just been held in Manchester, resolutions were passed declaring that competent periodical inspections should be enforced by law. It was held, however, that the administration of the system should not be entrusted to Government officers, but to district boards, "constituted partly of gentlemen elected by the steam-users themselves, and partly of *ex-officio* members, to be chosen on behalf of the public, the boards having the power of making such laws, rules, and regulations, from time to time, as might be found necessary for the conduct of the service."

Royal Albert Hall.—A meeting of the Executive Committee of the Royal Albert Hall has been held at the Hall, to settle the preliminaries for the opening by the Queen on the 29th of March. Present—the Right Hon. H. A. Bruce in the chair, Sir Thomas Biddulph, Mr. Bowring, Mr. Cole, Mr. Thring, and Lieut.-colonel Scott, secretary. It was resolved to give the proprietors of seats and season-ticket holders for the London International Exhibition special privileges in obtaining tickets of admission. Advertisements have since been issued.

The Tower Subway.—This subway is now to be used for foot traffic, without any machinery. Mr. Barlow, jun., the engineer to the company, states that this was one of the plans originally held in view as an alternative, although the first experiment was made with machinery. The foot traffic, it is believed, will be more beneficial to the public and more profitable to the company. On the 24th December the opening for foot traffic took place; and it has increased from 10,900 passengers in the first week to 20,000 for the last week preceding the 18th of January.

Sanitary State of Bridport.—In consequence of a series of delays connected with divers schemes for the sanitary improvement of Bridport, Mr. Arnold Taylor, on the part of the Government authorities at Whitehall, has written to the local Board of Health on the subject, and the Board has in consequence resolved, *nem. con.*, "That the council pledge themselves, as the sewage and local authority of the borough, to forthwith carry out a thorough and comprehensive system of main sewage and sewage outfall and disposal."

Microscopic Photography further Utilised.—A correspondent in Paris, writing on the 11th, says that a pigeon had just reached the city bringing despatches for the Government, which, when printed, filled three or four columns of a newspaper, besides 15,000 private despatches. All this news had been reduced to such microscopic size that it was conveyed in a small quill delicately attached to the bird's feathers!

The Builders' Benevolent Institution.—The annual ball of the Builders' Benevolent Institution will take place at Willis's Rooms, King-street, St. James's, on Thursday, the 2nd of February. It is to be hoped the charity will, as usual, be well supported by the trade and those interested in it.

Influence of Woods on Climate.—At the last meeting of the Scottish Meteorological Society, a letter was read from Sir Patrick Grant, G.C.B., Governor of Malta, intimating that in consequence of a paper published in the Society's *Journal* for April last, he had recommended a grant of 1,000*l.* a-year for ten years, to be appropriated to forming plantations of wood in Malta. The object of the paper in question was to show that plantations would increase the water supply of the island and ameliorate its climate.

The Ipswich Surveyorship.—Mr. W. P. Ribbans, the town surveyor of Ipswich, has died suddenly of apoplexy. The local board have passed a formal vote, expressive of their esteem and regret. They have also resolved to separate the offices of surveyor and inspector of nuisances for the future, and to appoint a surveyor not more than forty-five years of age. The salaries have also been under consideration.

Proposed Cottage Hospital.—A public meeting has been held to consider the propriety of establishing a Cottage Hospital for Swindon and its neighbourhood. Mr. A. L. Goddard presided. It was unanimously resolved,—"That it is advisable to establish a Cottage Hospital for Swindon and its neighbourhood;" and a committee was formed to get all necessary information upon the subject.

Conciliation and Arbitration between Employers and Employed.—On Monday, the 30th inst., at eight o'clock, a paper will be read at a meeting of the Social Science Association, Adam-street, Adelphi, by Mr. Rupert Kettle, "On Boards of Conciliation and Arbitration between employers and employed, and what is required to give them further success."

Royal Architectural Museum.—A meeting of the council was held at the Museum, on the 23rd inst., when the report of the sub-committee on the financial position of the museum was considered, and a conference took place with members of the Architectural Association, to determine respecting the Architectural Exhibition proposed to be held in the Museum Building.

TENDERS.

For road and drainage works, at Gipsy-hill, for the United Land Company (Limited). Mr. John Ashdown, architect. Quantities supplied by Mr. J. S. Lee:—

Pearson	£4,399 0 0
Wigmore	3,999 10 0
Pizzey	3,680 0 0
Dickinson & Oliver	3,650 0 0
Haynes	3,228 0 0
Mayo	3,000 0 0
Vickers & Crane (accepted)	1,990 0 0

For the erection of villa residence, at Camden-park, Kent, for Mr. G. H. Chubb. Messrs. John Tarring & Son, architects:—

Keyes & Head	£1,410 0 0
Scrivener	1,352 0 0
Snowdon	1,325 0 0
Colls & Son	1,294 0 0
Shepherd	1,290 0 0

For alterations and additions to Wykham Park House, Banbury, for Mr. Wm. Newburn. Messrs. John Tarring & Son, architects:—

Kimberley	£1,490 15 0

For kitchen, offices, and fittings, at St. Luke's Workhouse, for the Guardians of the Poor of the Holborn Union. Mr. H. Saxon Snell, architect:—

Lathey, Brothers	£2,773 0 0
Bamford	2,650 0 0
Wright, Brothers, & Goodchild	2,415 0 0
Gibson, Brothers	2,397 0 0
Woodward	2,340 0 0
Wicks, Bangs, & Co.	2,250 0 0
Perry, Brothers	2,247 0 0
Howard	2,199 0 0
Manley & Rogers	2,197 0 0
Sabey	2,180 0 0
Rivett	2,142 0 0
Sheffield	2,080 0 0
Crabbe & Vaughan	1,943 0 0

For erection of village hospital, at Sudbury, for Miss Copland. Messrs. E. Habershon & Brock, architects:—

Kindell	£695 0 0
Haynes	640 0 0

For road-making, at Gipsy-hill, for Lambeth Vestry:—

Fullett	£424 0 0
Clark	410 0 0
Pearson	355 0 0
Green	330 0 0
Riley	277 10 0

For erection of house on the East Cliff, Bournemouth, for Mr. Charles H. Gatty. Messrs. E. Habershon & Brock, architects:—

Golton (accepted)	£3,571 17 0

For road and drainage works, at Wolverhampton, for the United Land Company (Limited). Mr. John Ashdown, surveyor. Quantities supplied by Mr. J. S. Lee:—

Wigmore	£2,499	10	0
Marriott	1,900	0	0
Clarke	1,763	10	0
Haynes	1,598	0	0
Owens	1,484	0	0
Vickers & Crane	1,403	0	0
Law	1,269	0	0
Strickson (accepted)	1,228	1	6

TO CORRESPONDENTS.

W. B. W.—R. T.—G. R. R.—A. S.—C. B. A.—F. F.—W. & Co.—G. J.—J. G.—H. S. S.—F. P.—J. L.—H. & B.—J. T.—V. de M.—S. & Co.—Messrs. D.—T. H.—T. P.—W. C.—F. P.—H. C.—D.—C. B.—J. N.—W. R.—Messrs. L.—J. P.—Messrs. T.—F. D. W.—W. N.—Ædile.—A. D.—Mr. S.—A Car penter.—R. S.—A. W.—F. K. (builders have, we believe, rec vered under such circumstances, when invited to tender, without reservation).—Young Rupert (a good book on the subject was reviewed in these pages not long ago).—J. R. (send us such observations as you may be willing to make).—St. Alban's (will appear).—J. F. (will appear).—Amateur (will appear).—Winchester (thanks).

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of Tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

NOTICE TO SUBSCRIBERS.

In consequence of the Reduction in the Newspaper Postage, Subscribers within the United Kingdom can now be supplied with THE BUILDER *direct from the Office, at the rate of Nineteen Shillings per annum,* PAYABLE IN ADVANCE.

The Publisher cannot be responsible for TESTIMONIALS *left at the Office in reply to Advertisements, and strongly recommends that* COPIES ONLY *should be sent.*

Advertisements cannot be received for the current week's issue later than **THREE o'clock, p.m.,** *on THURSDAY.*

☞ *NOTICE.—All Communications respecting Advertisements, Subscriptions, &c., should be addressed to "The Publisher of the Builder," No. 1, York-street, Covent Garden. All other Communications should be addressed to the "Editor," and* NOT *to the "Publisher."*

INDIAN CIVIL ENGINEERING COLLEGE, COOPER'S-HILL, SURREY.—By order of the Secretary of State for India in Council.—Notice is hereby given, that a COMPETITIVE EXAMINATION will be held in JUNE next, for the SELECTION of FIFTY CANDIDATES for ADMISSION to this COLLEGE.—The examination will be open to all British-born subjects of good character and sound constitution, who are between the ages of seventeen and twenty-one years. The successful competitors, after undergoing a course of instruction at the College, including a practical course under a Civil or Mechanical Engineer, and on being found qualified, will be appointed to the Engineer Service of the Indian Government, on a salary commencing at Rs. 4,800 (about 420l.) per annum. The examination will embrace the following subjects:—

	Marks assigned.
English: composition ..... 500 }	1,000
" history and literature ..... 500 }	
Mathematics, pure and mixed	2,000
Latin	1,000
Greek	1,000
French	750
German	750
Natural and Experimental Sciences, limited to not more than three of the four following branches, viz. (1) chemistry; (2) heat and light; (3) electricity and magnetism; (4) geology and physical geography	2,000
Mechanical (geometrical) drawing	500
Freehand (figure and landscape) drawing	500

The charge made to students at the College will be at the rate of 150l. per annum. For further particulars apply, *by letter only*, to the Secretary, Civil Service Commissioners, Cannon-row, Westminster; or to the Secretary, Public Works Department, India-office.

(Signed) HERMAN MERIVALE.

India-office, 30th November, 1870.

"WORKING PEOPLE and IMPROVED HOMES."

The new and illustrated edition of "The Dwellings of the Labouring Classes," by HENRY ROBERTS, Esq. F.S.A. (author of "Home Reform," and "The Physical Condition of the Labouring Classes") will be found a summary of the efforts at home and abroad to secure "Healthy Homes" for working men and women.

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